PRACTICE EXAM 5: ASE A6 SIMULATION (50 QUESTIONS)

1. A 48-watt headlight operates at 12 volts. What current does this bulb draw?

A. 0.25 amperes

B. 576 amperes

C. 4 amperes

D. 36 amperes

2. A technician measuring resistance on a component reads 2,500 ohms. In engineering notation, this value is expressed as:

A. 2.5 kilo-ohms (kΩ)

B. 2.5 mega-ohms (MΩ)

C. 2.5 milliohms (mΩ)

D. 250 ohms (Ω)

3. When a conductor's cross-sectional area is doubled, its electrical resistance will:

A. Remain unchanged because material and length are unchanged

B. Double, making the wire warmer under load

C. Increase by a factor of four due to surface area effects

D. Be cut in half, because resistance is inversely related to area

4. A technician uses a lab scope to view a signal. The signal shows a 5-volt peak with a duty cycle of 25%. This signal is likely:

A. A failed sensor output stuck at full scale voltage

B. A pulse-width modulated control signal in its early duty cycle

C. A damaged network wire causing signal reflections

D. A normal analog sensor operating at mid-range

5. The Greek letter μ (mu) in electrical notation typically represents:

A. Micro, meaning one millionth of the base unit

B. Mega, meaning one million times the base unit

C. Milli, meaning one thousandth of the base unit

D. Mutual inductance between two coils in a circuit

6. A circuit uses three 12-ohm resistors connected in parallel. What is the total resistance?

A. 36 ohms

B. 3 ohms

C. 4 ohms

D. 12 ohms

7. A technician is troubleshooting a starter circuit. With the key in START position, the technician reads 12.6 volts at the battery but only 10.9 volts at the starter solenoid battery terminal. The difference indicates:

A. A normal reading for a healthy cranking circuit

B. The battery is discharged and needs replacement

C. The solenoid is drawing excessive field current

D. High resistance between the battery and solenoid terminal

8. Solder joints in automotive electrical repairs should use:

A. Acid-core solder for strength and corrosion resistance

B. Rosin-core (electronic) solder to avoid damaging conductors

C. Lead-free tin solder without any flux at all

D. Silver-bearing structural solder for mechanical bonding

9. A technician finds that flexing a wire harness makes a circuit work intermittently. The MOST likely cause is:

A. A broken wire inside the insulation at the flex point

B. Crossed signal wires within the harness bundle

C. A partially corroded fuse in the primary circuit

D. A shorted ground connection at the load side

10. Technician A says that voltage drop testing requires current flow in the circuit to be meaningful. Technician B says an ohmmeter reading on a de-energized circuit always reveals the same information as a voltage drop test. Who is correct?

A. Both A and B

B. Technician B only

C. Technician A only

D. Neither A nor B

11. The CAN bus uses what voltage levels for the dominant state?

A. 0 volts on both CAN-H and CAN-L at all times

B. 2.5 volts on both wires, equal to the idle reference

C. 5 volts on CAN-H and 0 volts on CAN-L

D. 3.5 volts on CAN-H and 1.5 volts on CAN-L

12. A wiring diagram shows a component connected to ground through a series of loads. This configuration is called:

A. A parallel circuit supplying multiple loads

B. A series circuit with loads sharing current

C. A bridge rectifier circuit with four diodes

D. A differential signal pair with opposing voltages

13. A technician must decide whether a wire's resistance is significant. The wire is 10 feet long, 16 gauge, and carries 5 amperes. The voltage drop is:

A. Less than 0.2 volts, well within specification

B. Approximately 3 volts, requiring immediate replacement

C. Exactly 5 volts regardless of length

D. Zero volts because stranded wire has no resistance

14. A battery's capacity is specified as 80 Ah. This rating represents:

A. The maximum voltage the battery produces under load

B. The battery's internal resistance in ohms over time

C. The amp-hours the battery can deliver at a specified discharge rate

D. The temperature range where the battery will start a vehicle

15. Technician A says lithium iron phosphate batteries can be charged with any standard automotive battery charger. Technician B says lithium batteries require specialized chargers designed for their chemistry. Who is correct?

A. Neither A nor B

B. Both A and B

C. Technician A only

D. Technician B only

16. A flooded lead-acid battery with six cells at 2.1 volts each produces a total voltage of:

A. 12.6 volts at full charge

B. 24 volts when connected properly

C. 14.7 volts during normal charging

D. 10 volts when partially discharged

17. Voltage drop testing on a positive starter cable during cranking reveals 0.8 volts drop. This reading indicates:

A. A completely healthy cable operating within specification

B. A failed ignition switch preventing starter operation

C. Excessive resistance requiring cable inspection or replacement

D. A shorted solenoid drawing excess current during cranking

18. A customer reports that their vehicle battery keeps discharging after the car sits for several days. The MOST appropriate test is:

A. A state-of-charge test with the engine running for 10 minutes

B. A parasitic draw test using a current clamp on the negative cable

C. A load test at one-half the battery's CCA rating for 15 seconds

D. A specific gravity test on each cell of the battery

19. When disconnecting a battery for electrical service work, the correct sequence is:

A. Positive cable first, negative cable second

B. Both cables simultaneously to prevent sparks

C. Only the negative cable if the battery is shielded

D. Negative cable first, positive cable second

20. A technician observes a vehicle that cranks slowly and detects high current draw during starter engagement. The MOST likely cause is:

A. Starter internal binding or shorted armature winding

B. A weak battery supplying insufficient cranking voltage

C. A blown ignition fuse stopping the starting circuit

D. Normal cranking for a cold engine and thick oil

21. A conductance tester reports "Good" after testing a battery. This means:

A. The battery is fully charged at the time of testing only

B. The battery has exactly its rated cold cranking amperes

C. The battery meets its CCA specification and should support normal service

D. The battery has completed a full load test for 30 seconds

22. Cold Cranking Amperes is measured at:

A. 0°F for 30 seconds while maintaining 7.2 volts

B. 32°F for 15 seconds at one-half the rated capacity

C. 70°F under normal temperature conditions

D. 100°F to simulate hot engine cranking conditions

23. An alternator's output voltage is typically regulated to:

A. Exactly 12 volts to match battery voltage

B. 16 volts to rapidly recharge a discharged battery

C. 10 volts to prevent damage to electronic modules

D. Approximately 14.0 to 14.7 volts for optimal battery charging

24. When an alternator diode fails, the technician may observe:

A. Zero output voltage at the alternator B+ terminal

B. Excessive AC ripple on the DC output waveform

C. Overvoltage that damages the charging system

D. Normal operation with slightly higher fuel economy

25. An overrunning alternator pulley (OAP) includes a one-way clutch that:

A. Allows the alternator rotor to continue spinning when engine RPM drops

B. Increases the drive ratio from the crankshaft to the alternator

C. Prevents alternator overcharging during high-speed driving

D. Engages only when the ignition is in the RUN position

26. A customer's vehicle shows a charging system warning lamp with the engine running. The technician FIRST should:

A. Replace the alternator as the most common cause

B. Check battery voltage to confirm it is being maintained

C. Measure alternator output voltage at the battery terminals

D. Disconnect the battery to reset the system warning

27. Drive belt slippage during charging system operation produces:

A. A consistent 14.7-volt output at all engine speeds

B. Reduced alternator output that may appear as an alternator fault

C. Excessive AC ripple on the alternator output signal

D. Elevated voltage output with reduced current capacity

28. A halogen bulb is touched with bare fingers during installation. The technician should:

A. Install the bulb and monitor for failure during operation

B. Use a paper towel to wipe off any visible marks

C. Discard the bulb because skin oils will cause failure

D. Clean the glass envelope with isopropyl alcohol before installing

29. HID headlights operate by:

A. Producing an electric arc between two electrodes in xenon gas

B. Passing current through a tungsten filament at high temperature

C. Exciting phosphor coatings with ultraviolet radiation

D. Using a high-frequency DC signal to illuminate LED arrays

30. A customer's vehicle has both headlights dim compared to normal. The FIRST test the technician should perform is:

A. Replace both bulbs to eliminate age-related dimming

B. Adjust the headlight aim to compensate for dim output

C. Check the alternator output under engine idle conditions

D. Perform voltage drop testing on both sides of the headlight circuit

31. Center high-mount stop lamps (CHMSLs) are required to:

A. Operate continuously whenever the headlight switch is on

B. Illuminate only during brake application, not as a tail lamp

C. Produce a specific flashing pattern during deceleration

D. Function as a reverse light when the transmission is in park

32. A brake light circuit has failed on one side. The technician FIRST should:

A. Replace the brake light switch at the pedal assembly

B. Adjust the brake light switch position at the pedal

C. Scan the body control module for brake circuit DTCs

D. Check the bulb and its socket connections on the failed side

33. Daytime running lights (DRLs) are mandatory in which jurisdiction?

A. Canada, which requires them on all new vehicles

B. European Union on heavy commercial vehicles only

C. All U.S. states for vehicles manufactured after 2020

D. Australia in coastal metropolitan regions only

34. A modern instrument cluster backlight typically uses:

A. Incandescent lamps that create warm color illumination

B. Vacuum fluorescent tubes with phosphor coatings

C. LED arrays with PWM dimming control

D. Electroluminescent panels behind the gauge faces

35. A fuel level gauge reads incorrectly high. The technician has verified the sending unit resistance values match specifications and the wiring is intact. The fault is MOST likely in:

A. The fuel pump drawing excessive current during operation

B. The instrument cluster's fuel gauge circuit or display

C. The ground connection at the battery negative post

D. The fuel pressure regulator limiting system flow

36. A modern vehicle's speedometer displays vehicle speed based on:

A. A dedicated speed sensor wired directly to the cluster

B. The ignition system's pulse rate at engine idle

C. Mechanical cable drive from the transmission

D. Network messages from the ABS module or VSS

37. A warning lamp fails to illuminate during the key-on bulb check. This indicates:

A. A fault in the lamp or its driver circuit itself

B. A problem in the system the lamp monitors

C. The battery voltage being too low to activate the lamp

D. A normal condition because the lamp is defective

38. After installing a replacement instrument cluster on a modern vehicle, the vehicle will not start. The MOST likely cause is:

A. A blown fuse during the replacement procedure itself

B. An incorrect cluster part number for the vehicle

C. The cluster has not been programmed or synchronized with the immobilizer

D. The battery discharged during the replacement work

39. A head-up display requires a specific windshield because:

A. The windshield surface must be cleaned regularly for proper function

B. The HUD projector must be calibrated to the driver's seat height

C. The projector produces heat that must be vented through special glass

D. A standard windshield causes ghost images due to double reflection

40. A power window fails to operate from either its own switch or the master switch. The MOST likely cause is:

A. A failed master switch that controls both positions

B. A failed window motor or open circuit to the motor

C. A discharged battery affecting only that one window

D. A blown fuse affecting multiple window circuits

41. Modern power windows with auto-up pinch protection detect obstructions by:

A. Monitoring motor current for the spike caused by obstruction

B. Using infrared sensors across the window opening path

C. Measuring motor torque through a strain gauge

D. Timing the complete up-travel cycle against a stored limit

42. A driver's power door lock actuator operates from the fob but not from the interior switch. The fault is MOST likely in:

A. A completely failed lock actuator requiring replacement

B. A blown fuse affecting both fob and switch commands

C. Unsynchronized rolling codes between the fob and module

D. The interior switch or its signal wire to the door module

43. A rear defogger has one trace that is not heating while others operate normally. The fault is in:

A. The defogger relay controlling the entire grid operation

B. The specific trace on the glass, which is broken

C. The dashboard defogger switch and indicator lamp assembly

D. The body control module's defogger timer logic circuit

44. An occupant classification system must be calibrated after:

A. Replacing the vehicle's main 12-volt battery

B. Any engine control module software reprogramming event

C. Replacing, repairing, or modifying the front passenger seat

D. Any work involving the brake master cylinder or fluid

45. A horn that sounds continuously with the steering wheel button not pressed indicates:

A. A burned-out horn relay stuck in the closed position

B. A disconnected horn ground wire at the mounting bracket

C. An open circuit between the horn switch and the horn

D. A shorted horn switch or short to ground in the switch wiring

46. A keyless entry fob works intermittently at long range but reliably at short range. The MOST likely cause is:

A. A weak or depleted battery inside the key fob

B. A failed radio receiver in the vehicle's entry module

C. An unsynchronized rolling code requiring reprogramming

D. Radio interference from nearby cellular towers

47. Before performing any SRS component service, the technician MUST:

A. Scan the SRS module for DTCs with ignition on first

B. Remove only the driver's airbag connector for testing

C. Disconnect the battery and wait the manufacturer-specified time

D. Discharge the steering wheel by manual rotation during service

48. Squib circuits in airbag systems include shorting bars that:

A. Improve diagnostic scan tool communication on the circuit

B. Automatically short the squib wires when disconnected to prevent accidental deployment

C. Reduce electromagnetic interference from the SRS harness

D. Measure squib resistance during the module's active operation

49. A gateway module in a modern vehicle is designed to:

A. Store diagnostic trouble codes from every module in the vehicle

B. Translate messages between different vehicle network types

C. Power distribute 12-volt current to multiple module locations

D. Terminate the vehicle's CAN bus at both its physical endpoints

50. A U0100 diagnostic trouble code indicates:

A. A power supply fault in the body control module circuits

B. A voltage regulator fault in the charging system operation

C. Lost communication with the engine control module

D. Excess fuel pressure detected in the engine's fuel rail

Practice Exam 5: Answer Key and Explanations

1. C — Current equals power divided by voltage: 48 W ÷ 12 V = 4 amperes. This calculation applies Ohm's Law inversely to determine current draw when bulb wattage and voltage are known. Recognizing this relationship is essential for sizing fuses, evaluating wire gauges, and predicting circuit loads during diagnosis.

2. A — Engineering notation uses the prefix "kilo" (k) to represent one thousand. Therefore 2,500 ohms equals 2.5 kilo-ohms (kΩ). Fluency with common prefixes — milli (m), kilo (k), and mega (M) — and their meanings is fundamental for reading specifications and technical literature accurately.

3. D — Resistance is inversely proportional to a conductor's cross-sectional area. Doubling the area cuts resistance in half because electrons have twice the pathway available for current flow. This is why automotive starter cables and main power feeds use thick wire — to minimize voltage drop under heavy current load.

4. B — A pulse-width modulated signal in its early duty cycle shows a short pulse width relative to the full cycle period, typical of 25% duty cycle operation. PWM signals are used extensively in automotive applications including fuel injector control, alternator field regulation, and electric fan control. Understanding duty cycle interpretation is essential for modern diagnostic work.

5. A — The Greek letter μ (mu) represents "micro" — one millionth (10^{-6}) of the base unit. Common automotive applications include microfarads (μF) for capacitor values. Confusing micro, milli (m), and mega (M) produces severe errors in specification reading and diagnostic calculations.

6. C — Three equal parallel resistors have a combined resistance of R÷N, where N is the number of resistors. With three 12-ohm resistors in parallel: 12 ÷ 3 = 4 ohms. This formula applies only when all parallel resistors are equal; unequal resistors require the reciprocal formula: 1/R_total = 1/R1 + 1/R2 + 1/R3.

7. D — A 1.7-volt drop between the battery and solenoid battery terminal during cranking indicates significant resistance in the positive cable or its terminations. Acceptable voltage drop is typically under 0.5 volts; 1.7 volts is excessive. The cable, terminals, or connections require cleaning, tightening, or replacement to restore normal starter operation.

8. B — Rosin-core (electronic) solder contains a non-corrosive flux safe for electrical work on automotive wiring and connections. Acid-core solder contains corrosive flux that attacks copper and destroys connections over time — acid-core has no place in automotive electrical repair. This is a fundamental rule for all automotive electrical splicing and soldering work.

9. A — An intermittent circuit that responds to flexing the harness indicates a broken wire inside the insulation at the flex point. The insulation may appear intact, but the copper conductors inside have fatigued and broken from repeated flexing. This is a common failure mode on harnesses that pass through door jambs, trunk hinges, or other flex zones.

10. C — Voltage drop testing requires current flow to develop measurable voltage across hidden resistance. An ohmmeter on a de-energized circuit often cannot detect small resistance changes that cause significant voltage drop under load. Technician A is correct; Technician B is wrong. Voltage drop testing reveals problems that ohmmeter testing misses entirely.

11. D — In the dominant state of CAN bus, CAN-H is driven to approximately 3.5 volts while CAN-L is pulled to approximately 1.5 volts, creating a 2-volt differential. In the recessive state, both wires sit at approximately 2.5 volts with no differential. Understanding these voltage levels is essential for diagnosing CAN bus faults with a scope.

12. B — A circuit with components connected to ground through loads in sequence is a series circuit. Current flows through one path through all loads, and voltage drops sum to the source voltage. This distinguishes it from a parallel circuit where current splits among multiple paths simultaneously. Recognizing circuit types from schematics is foundational.

13. A — A 16-gauge wire at 5 amperes over 10 feet produces minimal voltage drop — typically 0.2 volts or less based on standard AWG current-carrying calculations. This is well within acceptable specifications. For reference, 16 gauge safely carries 20+ amperes in typical automotive applications without significant voltage drop at 5 amperes.

14. C — Amp-hours (Ah) measure a battery's energy storage capacity — how many amperes it can deliver at a specified discharge rate for a specific duration. A 50 Ah battery could theoretically deliver 5 amperes for 10 hours or 1 ampere for 50 hours. This rating is important for deep-cycle and accessory load calculations.

15. D — Lithium batteries require chargers specifically designed for their chemistry, which monitor per-cell voltages and temperatures and use different charging profiles than lead-acid. A conventional lead-acid charger can damage or destroy a lithium battery and create fire hazards. Technician B is correct; Technician A is wrong.

16. A — Six lead-acid cells in series at 2.1 volts per cell produce a total nominal voltage of 12.6 volts at full charge. This is the "12-volt battery" standard for automotive applications. Each cell's 2.1-volt open-circuit rating combines with the others through series connection to produce the overall battery voltage.

17. C — A 0.8-volt voltage drop across a positive starter cable during cranking is excessive. Acceptable drop is typically under 0.5 volts. This indicates corroded terminals, damaged cable, or loose connections that restrict current flow to the starter. Inspection and repair or replacement of the cable is required for normal starting performance.

18. B — A parasitic draw test uses a current clamp on the negative battery cable to measure the small current drawn when the vehicle is off. Normal parasitic draw is 30–50 milliamperes; excessive draw (200+ mA) discharges the battery during parking periods. This non-invasive test identifies which circuits are drawing excessive current without triggering module resets.

19. D — The correct disconnection sequence is negative cable first, positive cable second. This prevents accidental short circuits during the procedure. The opposite sequence (positive first) creates risk of wrenches bridging the live positive terminal to grounded metal. Reconnection reverses this: positive first, negative last.

20. A — Slow cranking combined with high current draw indicates starter internal damage — typically bearing failure, shorted armature winding, or mechanical binding. Normal cranking with adequate battery voltage should not cause excessive current. Starter replacement is typically required; bench testing confirms whether the motor itself is the fault.

21. C — A conductance tester evaluates internal battery condition electrically and produces a pass/fail result based on measured CCA compared to rated CCA. A "Good" result means the battery meets its specification and should provide normal service. This rapid test has largely replaced carbon-pile load testing in modern shops because it works on partially discharged batteries.

22. A — Cold Cranking Amperes is measured specifically at 0°F (−17.8°C) for 30 seconds while maintaining at least 7.2 volts at the battery terminals, per SAE J537. This test simulates worst-case cold-

start conditions when battery chemistry is slowest. The 7.2-volt threshold ensures sufficient voltage for ignition and fuel injection to function during cranking.

23. D — Automotive charging systems typically regulate output to 14.0–14.7 volts for optimal lead-acid battery charging. Higher voltages accelerate gassing and water loss; lower voltages prevent complete charging. The voltage regulator adjusts rotor field current continuously to maintain this target regardless of RPM or load. Modern computer-controlled systems may vary this target based on operating conditions.

24. B — A failed rectifier diode allows AC ripple to pass through to the DC output. Healthy alternators produce less than 100 mV of AC ripple at the battery terminals; diode failures can produce 500+ mV ripple. This ripple can damage vehicle electronics over time. Lab scope diagnosis of rectifier problems shows characteristic waveform patterns specific to each failure mode.

25. A — An overrunning alternator pulley includes a one-way clutch that disengages when the engine slows. This allows the alternator rotor's inertia to continue spinning without the engine's crankshaft driving it backward through the belt. This absorbs vibration from engine speed fluctuations and protects the alternator bearings and belt from premature wear.

26. C — The first diagnostic step for a charging system warning lamp is to verify actual alternator output by measuring voltage at the battery terminals during engine operation. This distinguishes between an alternator fault and a lamp circuit fault. Replacing the alternator without confirming the output is low is a common and costly diagnostic error.

27. B — Drive belt slippage reduces the mechanical torque transferred from engine to alternator, producing reduced electrical output that appears identical to an alternator fault. Belt inspection is essential before any electrical diagnosis — belt issues produce charging symptoms that are mechanical in origin. This is why Technician B's advice about inspecting the belt is a standard early diagnostic step.

28. D — Skin oils from fingers create thermal stress concentration points on halogen bulb glass envelopes, causing premature failure. If accidental contact occurs, cleaning the glass with isopropyl alcohol before installation removes the oils and allows normal service life. Never install a contaminated bulb; discarding and replacing is unnecessary if alcohol cleaning is available.

29. A — HID (high-intensity discharge) headlights produce light by establishing an electric arc between two electrodes inside a xenon-filled capsule. The arc ionizes metal halide salts, producing brilliant

bluish-white light at efficiency several times higher than halogen. This requires high-voltage ballasts that generate 15,000+ volt ignition pulses to strike the arc initially.

30. D — Dim headlights typically result from excessive voltage drop in the supply wiring or ground path. Voltage drop testing under load identifies the specific segment responsible — corroded connections, damaged wire, or poor terminal contact. Replacing bulbs or adjusting aim without diagnosing the actual voltage issue is ineffective. This systematic approach resolves most dim-headlight complaints.

31. B — Center high-mount stop lamps (CHMSLs) are brake-light-only devices — they do not function as tail lamps. CHMSL operates only during brake pedal application per FMVSS 108. This distinguishes them from rear tail lamps, which illuminate continuously with headlights. CHMSL has been required on U.S. passenger cars since 1986.

32. D — A single-side brake light failure typically indicates a bulb or socket fault on the affected side. The other side's normal operation confirms the brake switch, relay (if any), and wiring to the common feed are working. Starting diagnosis at the failed bulb location is the systematic approach; replacing the brake switch or scanning DTCs skips obvious checks.

33. A — Canada requires daytime running lights on all new passenger vehicles. This is a well-established regulatory requirement. DRLs are optional in the United States but are increasingly common due to safety benefits. Different jurisdictions have varied requirements, making it important to verify compliance for vehicles sold or operated internationally.

34. C — Modern instrument cluster backlighting uses LED arrays with pulse-width modulation (PWM) dimming control. LEDs are more efficient, longer-lasting, and allow precise brightness control through PWM signals. The dimmer control modulates the PWM duty cycle to vary average voltage to the LEDs and thus brightness. Older clusters used incandescent bulbs behind translucent panels.

35. B — If the sending unit tests correctly and wiring is intact, the fault must be in the instrument cluster itself. Modern clusters include internal electronic processing of fuel gauge signals that can fail independently of the sending unit and wiring. Cluster replacement or internal repair may be required; aftermarket alternatives may be available for some applications.

36. D — Modern vehicles receive speedometer data from network messages, typically broadcast by the ABS module that reads wheel speed sensors. The ABS module calculates vehicle speed from wheel

rotation data and transmits it on the CAN bus, where the cluster receives it and renders the speedometer display. This centralized architecture replaced the dedicated mechanical speed cables of older vehicles.

37. A — A warning lamp that fails to illuminate during the bulb check indicates the lamp itself or its driver circuit has failed. The self-test verifies each lamp is functional; a non-lighting lamp confirms a lamp-circuit fault specifically. This is distinct from a lamp that stays illuminated after the self-test, which indicates a fault in the monitored system.

38. C — Modern clusters store immobilizer authentication data that must match other modules. A replacement cluster not properly programmed or synchronized is rejected by the immobilizer, which denies the engine enable signal and prevents starting. Proper programming to the vehicle is mandatory on every cluster replacement, and this is the most common reason for no-start conditions after cluster swap.

39. D — HUD-equipped vehicles require a special windshield with a wedge-shaped PVB inner layer that prevents ghost imaging. A standard windshield reflects the projected image from both surfaces, creating the characteristic double image. The HUD-compatible windshield is specifically engineered to reflect the image from only one optical surface.

40. B — A window that fails to operate from both switches indicates the switching path is functional (since both can command it), so the problem is downstream at the motor or wiring. A failed motor, broken regulator cable, or open circuit to the motor prevents movement. Component-level testing at the motor terminals identifies which fault is present.

41. A — Modern pinch-protection monitors motor current through the H-bridge driver during up-travel. An obstruction causes a sudden current spike that the module detects and immediately reverses motor direction. This function is federally mandated on auto-up windows and protects occupants from pinching hazards. Current monitoring is the most practical and responsive method.

42. D — The lock actuator responds to fob commands, confirming the actuator, wiring, and module output are functional. The fault must be in the interior switch path, which is separate from the fob/module command path. A defective switch or broken switch-to-module wiring is the most likely cause and can be confirmed with a voltmeter at the switch output.

43. B — Defogger grids consist of multiple parallel traces; one broken trace disables only that specific line while others continue operating. A voltmeter walking along the broken trace locates where voltage

drops abruptly from battery voltage to zero. Small breaks can be repaired with silver-ceramic conductive paint kits; larger damage requires glass replacement.

44. C — Occupant classification systems require calibration after any service involving the passenger seat — cover replacement, cushion repair, or sensor modification. Uncalibrated systems can misclassify occupants and make dangerous airbag deployment decisions. This safety-critical requirement must be completed before returning the vehicle to service; battery service, ECM reprogramming, or brake service do not trigger OCS calibration.

45. D — A continuously sounding horn has its control circuit continuously grounded somewhere. A shorted horn switch or short to ground in the switch wiring completes the circuit even with the button released. The horn operates because its normal control logic is always signaling to activate. Disconnecting the horn relay isolates the fault to either the switch side or the horn side.

46. A — A key fob working at short range but intermittently at longer range is the classic signature of a weak battery. The transmitter output is reduced, and range decreases as the battery weakens. This is the simplest and most common RKE complaint; battery replacement almost always restores normal range. Try this before proceeding to receiver diagnosis.

47. C — Every SRS requires a manufacturer-specified disabling procedure including battery disconnection and a waiting period (typically 1–10 minutes) for deployment-energy capacitors to discharge. Accidental deployment during service causes severe injury. Scanning DTCs or probing circuits with active SRS is not sufficient for physical component service; proper system disabling is mandatory.

48. B — Squib connectors include shorting bars that automatically short the squib wires together when the connector is disconnected. This prevents stray voltages from static electricity, inadvertent battery contact, or test equipment from triggering accidental airbag deployment. When the connector reconnects, the bar retracts to allow normal operation. This is a critical safety feature during service.

49. B — Gateway modules translate messages between different network types — high-speed CAN to low-speed CAN, forwarding relevant data to LIN sub-networks, routing between CAN and Ethernet for cameras and ADAS. Without gateways, modern vehicles with multiple network protocols could not coordinate their systems. Gateway failures produce widespread symptoms across apparently unrelated systems.

50. C — The U0100 code specifically indicates lost communication with the engine control module. U-codes (network family) identify communication faults; each specific number points to a particular module. Multiple U-codes across many modules suggest bus-level faults; a single U0100 suggests the ECM is offline, in bus-off state, or has lost its connection to the network..