PRACTICE EXAM 13: ASE A6 SIMULATION (50 QUESTIONS)

1. A circuit has a 5-ohm resistor drawing 2.4 amperes. The voltage applied to the circuit is:

A. 12 volts during operation

B. 0.48 volts across the resistor

C. 7.4 volts of drop

D. 2.08 volts at steady state

2. A technician measures resistance on a wire using a DMM and reads OL (overload). This indicates:

A. Normal low resistance in the wire

B. The resistance is within specification

C. An open circuit in the wire being tested

D. A short to ground in the circuit

3. Technician A says that in a parallel circuit, the total resistance is greater than any individual resistance. Technician B says that in a parallel circuit, the total resistance is less than the smallest individual resistance. Who is correct?

A. Technician A only

B. Technician B only

C. Both A and B

D. Neither A nor B

4. Watt's Law calculates electrical power using:

A. Voltage divided by current at steady state

B. Resistance multiplied by length of conductor

C. Current squared divided by resistance only

D. Voltage multiplied by current in a circuit

5. A wire color code of "OR/BK" indicates:

A. A solid orange wire with no tracer marking

B. An orange base color with a black tracer stripe

C. Two separate wires bundled together, orange and black

D. A black base color with an orange primary stripe

6. The primary purpose of a circuit protection device (fuse or breaker) is to:

A. Protect wiring from overcurrent and fault conditions

B. Improve current flow through the circuit components

C. Maintain constant voltage at the load under varying demand

D. Reduce electromagnetic interference in signal circuits

7. A technician measures 0.4 volts of voltage drop across a ground connection during a 10-ampere test. This reading:

A. Is completely normal for all automotive applications

B. Indicates a failed load component in the circuit

C. Suggests excessive resistance requiring investigation

D. Shows an overcharging condition in the alternator

8. A digital multimeter has an input impedance of 10 megaohms on the voltage range. This means:

A. The meter can be used for high-current measurements only

B. The meter draws 10 amperes during voltage testing

C. The meter provides perfect accuracy on any circuit

D. The meter draws minimal current while measuring voltage

9. A soldered splice must be protected from moisture because:

A. Moisture causes corrosion that creates high resistance over time

B. Moisture improves electrical conductivity within the splice

C. Moisture prevents the solder from bonding to the copper

D. Moisture has no measurable effect on automotive splices

10. A short circuit that blows a 15-amp fuse immediately upon installation indicates:

A. An open circuit between the battery and the load

B. A normal high-current event during initial operation

C. A low-resistance path to ground causing excessive current

D. A failed fuse from the factory with no circuit fault present

11. A lab scope displays a waveform showing a 12-volt square wave that is high for 2 milliseconds and low for 3 milliseconds in each cycle. The duty cycle is:

A. 60 percent of full duty cycle

B. 40 percent of full duty cycle

C. 50 percent of normal output

D. 25 percent of continuous on time

12. Technician A says a MOSFET uses current at the base to control larger currents. Technician B says a MOSFET uses voltage at the gate to control current between drain and source. Who is correct?

A. Both A and B, depending on application

B. Technician A only

C. Neither, because MOSFETs work differently

D. Technician B only; MOSFETs are voltage-controlled

13. A wire gauge of 10 AWG is:

A. Thinner and higher resistance than 14 AWG wire

B. The same size as 14 AWG wire with different insulation

C. Thicker and lower resistance than 14 AWG wire

D. Used only for signal-level wiring applications

14. A battery cell's specific gravity reads 1.130. This indicates:

A. Approximately 25 percent state of charge

B. Fully charged at 100 percent capacity

C. A damaged cell that cannot be recharged

D. Over-charged condition requiring reduction

15. The primary advantage of an AGM battery over a conventional flooded battery is:

A. Significantly lower purchase cost for equivalent capacity

B. Higher nominal voltage output under normal conditions

C. Reduced cold-cranking capability for warm climates

D. Spill-proof construction and better deep-cycle tolerance

16. A parasitic draw test is typically performed to diagnose:

A. Slow engine cranking during cold weather

B. A battery that discharges when the vehicle sits unused

C. An alternator that fails to charge at idle

D. A starter that draws excessive current during operation

17. When connecting jumper cables, the final ground connection should be made to:

A. The engine block of the discharged vehicle, away from the battery

B. The negative terminal of the discharged battery directly

C. Any painted body panel of the discharged vehicle

D. The positive terminal of the good vehicle for safety

18. A starter cranking test shows 450 amperes on a starter rated for 200 amperes. This is MOST likely caused by:

A. A weak battery unable to supply rated current

B. A normal condition during cold-weather starting

C. Starter internal binding or shorted armature winding

D. An overcharged battery forcing excess current

19. Cold Cranking Amperes is the current a battery can deliver at 0°F for:

A. 15 seconds while maintaining 10.5 volts minimum

B. 60 seconds while maintaining 12 volts minimum

C. 5 seconds while maintaining 9.6 volts minimum

D. 30 seconds while maintaining 7.2 volts minimum

20. A starter that produces only a single click when activated MOST likely indicates:

A. A failed flywheel ring gear requiring replacement

B. Insufficient current due to a weak battery or bad connections

C. A broken timing belt preventing crankshaft rotation

D. A failed engine control module preventing injection

21. Sulfation in a lead-acid battery causes:

A. Overcharging conditions at any alternator setpoint

B. Improved cold-weather starting performance

C. An immediate rise in battery voltage under load

D. Reduced capacity and poor cranking performance

22. A battery's Reserve Capacity (RC) rating specifies:

A. The time in minutes the battery can deliver 25 amperes before dropping to 10.5 volts

B. The maximum cold cranking amperes at 0°F under standard conditions

C. The peak current output during a jump-start attempt

D. The number of complete discharge cycles the battery can tolerate

23. The voltage regulator on a modern alternator controls output by:

A. Switching between three-phase and single-phase stator operation

B. Varying the current through the rotor field winding electronically

C. Adjusting the mechanical drive ratio at the alternator pulley

D. Modulating the main output terminal voltage through a regulator chip

24. An alternator's three-phase AC is converted to DC using:

A. A single high-power transistor on the output terminal

B. Capacitors mounted externally to the alternator housing

C. Six rectifier diodes arranged as a full-wave bridge

D. The battery's chemical reaction during charging operations

25. A voltage drop test on the positive charging cable reads 0.2 volts during normal charging. This indicates:

A. A healthy cable with minimal resistance

B. Excessive resistance requiring cable replacement

C. A failed voltage regulator in the alternator

D. An overcharging condition requiring diagnosis

26. AC ripple measured at the battery terminals with the engine running should be:

A. Between 2 and 5 volts peak-to-peak under normal load

B. Anywhere from 0 to 8 volts during operation

C. Exactly 60 hertz at a fixed amplitude of 1 volt

D. Less than 100 millivolts under typical electrical load

27. A computer-controlled charging system commands reduced voltage during highway cruise because:

A. The alternator is unable to produce full output at highway speeds

B. The battery is likely fully charged and reduced voltage prevents overcharge

C. The engine control module limits charging to improve emissions

D. Voltage is intentionally reduced to protect the alternator from damage

28. Drive belt slippage commonly produces charging system symptoms that:

A. Only appear during cold-weather operation conditions

B. Disappear entirely at higher engine RPM values

C. Cause overcharging rather than undercharging

D. Mimic an alternator fault requiring electrical diagnosis

29. HID (xenon) headlight ballasts produce voltages that can be:

A. Safely tested with a standard incandescent test light

B. Measured with any DMM on the voltage range setting

C. Lethal during service if the system is not de-energized

D. Safely probed while the ignition is in the ACC position

30. A halogen bulb that fails prematurely after installation is MOST likely caused by:

A. Skin oils transferred during handling of the glass envelope

B. Voltage regulator overcharging during engine start

C. Incorrect wattage rating for the vehicle's electrical system

D. Moisture contamination from humid installation conditions

31. The Center High-Mount Stop Lamp (CHMSL) operates:

A. Continuously whenever the headlight switch is in the ON position

B. Only during turn signal activation, not brake application

C. Only during brake pedal application, independent of tail lights

D. As a reverse indicator when the transmission is in REVERSE gear

32. A turn signal on one side of a vehicle flashes at twice the normal rate. This symptom indicates:

A. A burned-out turn signal bulb on the fast-flashing side

B. A failed hazard flasher relay affecting both sides

C. An open circuit in the brake light wiring system

D. A short to ground in the dome light circuit

33. Federal Motor Vehicle Safety Standard 108 regulates:

A. Engine emissions standards for passenger vehicles

B. Motor vehicle exterior lighting and signaling requirements

C. Battery manufacturing safety production standards

D. Catalytic converter efficiency monitoring protocols

34. A modern instrument cluster's speedometer displays speed based on:

A. A mechanical cable driven by the transmission output shaft

B. A direct analog signal from the vehicle speed sensor

C. The engine control module's fuel injection pulse timing

D. A network message broadcast by the ABS module over CAN

35. A warning lamp illuminates during the key-on bulb check and then extinguishes. Later, the same lamp illuminates while driving. This indicates:

A. A normal bulb check sequence completing successfully

B. A fault condition has been detected in the monitored system

C. The cluster is defective and requires replacement

D. A low battery voltage affecting the display function

36. A customer reports the fuel gauge reads full when the tank is nearly empty. The sending unit's resistance is verified correct across its travel. The MOST likely fault is in the:

A. Fuel pump drawing excessive current during operation

B. Fuel pressure regulator limiting system flow to the rails

C. Instrument cluster's internal fuel gauge circuit processing

D. Ground connection at the battery negative terminal

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

A. The cluster has not been programmed to the vehicle immobilizer

B. A blown fuse during the replacement procedure itself

C. A disconnected wiring harness at the cluster connector

D. The battery discharged during the replacement work

38. A head-up display (HUD) shows a clear primary image with a faint ghost image above it. This is MOST likely caused by:

A. A weak HUD projector reaching the end of its service life

B. Software corruption in the HUD control module requiring reflash

C. A dirty windshield area where the HUD is projected

D. A standard replacement windshield installed on a HUD-equipped vehicle

39. A driver information center (DIC) displays incorrect outside air temperature while the scan tool shows correct sensor data. The fault is MOST likely in:

A. The outside air temperature sensor hardware itself

B. The DIC's internal data reception or display circuits

C. The wiring between the sensor and the BCM

D. The BCM's signal conditioning for the temperature data

40. A power window operates from the master switch but not from the passenger door switch. The MOST likely cause is:

A. A failed window motor requiring complete replacement

B. A blown fuse affecting the entire power window circuit

C. A defective passenger door switch or break in its wiring

D. A disconnected battery cable at the door control module

41. Pinch protection on a modern auto-up power window system works by:

A. Timing the up-travel cycle against a stored maximum duration value

B. Monitoring motor current for a spike caused by obstruction

C. Using infrared sensors across the window opening path detection

D. Measuring mechanical force on the window glass through strain sensors

42. A rain-sensing wiper system detects precipitation using:

A. Piezoelectric sensors measuring raindrop impact on the glass

B. Ultrasonic sensors detecting surface moisture content changes

C. Humidity sensors within the cabin HVAC ducting system

D. Infrared optical sensors measuring total internal reflection changes

43. A power door lock actuator on the driver's door operates from the fob but not from the interior lock switch. The MOST likely cause is:

A. A defective interior lock switch or break in its signal wire

B. A failed lock actuator with stuck internal contacts

C. An unsynchronized rolling code between the fob and vehicle

D. A blown fuse shared by both fob and switch commands

44. A horn that sounds weakly compared to normal is MOST likely caused by:

A. A completely failed horn that requires replacement

B. A stuck horn button on the steering wheel assembly

C. Voltage drop in the horn circuit wiring or connections

D. Low battery voltage affecting all vehicle electrical functions

45. A remote keyless entry fob operates only at very close range but not at the typical distance. The MOST likely cause is:

A. Damage to the vehicle's keyless entry receiver antenna

B. Radio frequency interference from external cellular towers

C. An unsynchronized rolling code between fob and vehicle

D. A weak or depleted battery inside the key fob

46. A rear defogger grid has one horizontal trace that does not heat while others operate normally. The fault is located in:

A. The specific trace on the glass surface, which is broken

B. The defogger relay controlling the entire grid operation

C. The dashboard defogger switch and its indicator lamp

D. The body control module timer circuit for the defogger

47. Before performing service on SRS airbag components, the technician MUST:

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

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

C. Remove the steering wheel to access the clock spring first

D. Discharge the SRS capacitors manually through the connector

48. A squib connector in an SRS airbag system includes a shorting bar that:

A. Measures squib resistance during normal SRS operation cycles

B. Provides a low-resistance reference for module diagnostic testing

C. Automatically shorts the squib wires when disconnected to prevent deployment

D. Reduces electromagnetic interference from the squib wiring harness

49. A healthy high-speed CAN bus measured across CAN-H and CAN-L with ignition off reads approximately:

A. 60 ohms, representing two parallel 120-ohm terminators

B. 120 ohms, representing a single active terminator in the bus

C. 240 ohms, representing both terminators connected in series

D. 30 ohms, representing three terminators in parallel

50. A gateway module failure on a modern vehicle MOST commonly causes:

A. Only the infotainment system to stop functioning properly

B. A single isolated DTC in one specific module only

C. The engine to fail to start with all other systems working

D. Multiple seemingly unrelated symptoms across different systems

Practice Exam 13: Answer Key and Explanations

1. A — Applying Ohm's Law, E = I × R, so 2.4 amperes × 5 ohms = 12 volts. This calculation determines voltage across any component when current and resistance are known. Fluency with the three rearrangements of Ohm's Law is fundamental for virtually every automotive electrical diagnostic scenario on the A6 exam.

2. C — OL (overload) on a DMM's ohms function indicates the resistance exceeds the meter's measurement range, effectively reading as infinite resistance. This confirms an open circuit in the wire being tested — no continuous path for current flow exists. Open circuits can result from broken wires, corroded connectors, or disconnected components.

3. B — In a parallel circuit, each additional resistor provides an additional path for current flow, reducing the total resistance. The total is always less than the smallest individual resistor in the parallel combination. Technician A is incorrect about parallel circuits. Understanding this relationship is fundamental for analyzing automotive electrical systems with multiple loads in parallel.

4. D — Watt's Law states that $P = E \times I$ — power equals voltage multiplied by current. This fundamental formula calculates power consumption in any electrical circuit. Combined with Ohm's Law ($E = I \times R$), these equations allow analysis of any two known circuit parameters. Fluency with both laws is essential for A6 exam preparation.

5. B — The standard wire color code convention lists the base color first and the tracer stripe second. "OR/BK" indicates an orange base color with a black tracer stripe. This notation appears throughout service information and is essential for identifying the correct wire within a harness bundle during diagnostic and repair work.

6. A — Circuit protection devices (fuses, circuit breakers, fusible links) are designed to protect the wiring harness from overcurrent conditions that would otherwise cause overheating, insulation damage, and potential fires. They sacrifice themselves to protect the more expensive and harder-to-replace wiring. Understanding this primary purpose is essential for selecting correct replacements.

7. C — A 0.4-volt drop on a ground connection at 10 amperes indicates approximately 0.04 ohms of resistance, which is at the upper limit of acceptable (typical specification is under 0.1 volts). This suggests corrosion or poor contact at the ground point requiring cleaning or repair. High-current ground circuits should maintain minimal voltage drop for proper operation.

8. D — A DMM with 10 MΩ input impedance draws minimal current (microamperes) from the circuit while measuring voltage. This high impedance prevents the meter from loading down the circuit and affecting its operation, which is essential for accurate measurements on sensitive electronic signals. Understanding meter impedance is important when testing module input signals.

9. A — Moisture intrusion into an unprotected splice causes corrosion that gradually increases resistance over time. This resistance creates voltage drop, reduces load performance, and can eventually create intermittent faults as corrosion worsens. Heat-shrink tubing with adhesive liner provides environmental sealing that prevents this long-term degradation in automotive applications.

10. C — A fuse that blows immediately upon installation indicates the circuit has a direct low-resistance path to ground — a short to ground. The excessive current flow through this path triggers the fuse to open protectively. Installing another fuse without locating and repairing the short will simply blow the replacement fuse.

11. B — Duty cycle is the percentage of each cycle that the signal is high (on). A signal high for 2 ms and low for 3 ms in a 5 ms total cycle has a duty cycle of 2 ÷ 5 = 40 percent. Duty cycle interpretation matters for PWM fuel injectors, alternator field drivers, and PWM-controlled accessory circuits.

12. D — MOSFETs (Metal-Oxide-Semiconductor Field-Effect Transistors) use voltage applied to an insulated gate to control current flow between drain and source. They are voltage-controlled devices drawing essentially no current through the gate. Technician A is wrong; Technician B correctly describes MOSFET operation. BJTs (not MOSFETs) use base current to control collector current.

13. C — The AWG scale is counterintuitive: smaller AWG numbers indicate larger, thicker wires with lower resistance. 10 AWG is thicker than 14 AWG, carrying more current with less voltage drop. This relationship is critical for understanding wire gauge specifications, matching replacement wires, and understanding automotive wiring requirements.

14. A — A specific gravity of 1.130 indicates approximately 25% state of charge. The scale is: 1.265-1.280 = fully charged, 1.225 = 75%, 1.180 = 50%, 1.130 = 25%, below 1.100 = essentially discharged. A battery at 25% state of charge should be fully charged and retested before evaluating its overall condition.

15. D — AGM (Absorbed Glass Mat) batteries provide spill-proof construction because the electrolyte is absorbed into fiberglass mats rather than being free liquid. They tolerate deep-cycle discharge better than flooded batteries, making them ideal for start-stop applications. These advantages justify their higher cost compared to conventional flooded batteries for specific applications.

16. B — A parasitic draw test diagnoses batteries that discharge during periods when the vehicle is not operated. This excessive current draw is caused by modules that fail to enter low-power states, or

circuits that continuously draw current when the ignition is off. The test identifies which circuits are responsible for excessive sleep-mode current consumption.

17. A — The final ground connection during jump-starting should be made to the engine block of the discharged vehicle, away from the battery. This places any spark that may occur during connection away from the battery, where hydrogen gas from battery charging may have accumulated. Direct connection to the battery negative creates explosion risk.

18. C — A starter drawing 225% of rated current indicates starter internal damage — binding bushings, dragging armature, or partial shorts in the field or armature windings. This excess draw suggests mechanical or electrical internal problems that starter replacement typically addresses. Rebuilding starters is increasingly uncommon due to the availability of remanufactured units.

19. D — Cold Cranking Amperes is specified at 0°F (−17.8°C) per SAE J537, for 30 seconds while maintaining at least 7.2 volts at the battery terminals. This simulates worst-case cold-start conditions when battery chemistry is slowest and engine oil is thickest. The 7.2-volt threshold ensures sufficient voltage for ignition and fuel injection to function.

20. B — A single click with no cranking indicates the solenoid is engaging but insufficient current is reaching the starter motor. This is typically caused by a weak battery, corroded terminals, or high resistance in the cables or connections. Voltage drop testing under cranking conditions identifies the specific voltage loss location for repair.

21. D — Sulfation develops when a battery remains in a partially discharged state for extended periods. Lead sulfate crystals harden on the plates over time and eventually stop participating in the charge-discharge reaction. This reduces capacity and produces poor cranking performance as the battery ages. Severe sulfation is permanent and causes eventual battery failure.

22. A — Reserve Capacity (RC) is defined as the number of minutes a fully charged battery at 80°F can deliver 25 amperes before terminal voltage drops to 10.5 volts. This specification measures the battery's ability to support vehicle loads if the charging system fails. Higher RC values provide more operational time on battery-only power after alternator failure.

23. B — The voltage regulator controls alternator output by varying the current through the rotor field winding. Stronger field current creates a stronger magnetic field, which induces higher voltage in the

stator. Weaker field current reduces output voltage. This electrical field control enables voltage regulation independent of RPM and load conditions.

24. C — A rectifier bridge uses six diodes arranged in pairs to convert three-phase AC from the stator into DC output. Three positive diodes and three negative diodes form the bridge, with two diodes conducting at any instant corresponding to whichever two phases currently have the greatest voltage difference. This produces the smooth DC output for vehicle loads.

25. A — A voltage drop of 0.2 volts across a charging cable during charging is well within normal specification (typically under 0.5 volts is acceptable). This reading indicates a healthy charging cable with minimal resistance. Higher drops would suggest corrosion or damage requiring repair, but 0.2 volts confirms the cable is operating normally.

26. D — A healthy rectifier bridge produces less than 100 millivolts of AC ripple at the battery terminals under normal load. Some residual AC always remains because three-phase rectification is not perfectly smooth, but output should be predominantly DC. Readings above 500 mV indicate rectifier diode failure and typically require alternator replacement.

27. B — Modern computer-controlled charging systems intentionally reduce voltage when the battery is detected as fully charged during stable cruise conditions. This conserves fuel by reducing alternator load and protects the battery from overcharging. Understanding this adaptive behavior prevents unnecessary alternator replacement when the system is simply operating within its programmed strategy.

28. D — 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 because belt issues produce charging symptoms that are mechanical in origin. This inexpensive check can prevent unnecessary alternator replacement.

29. C — HID ballasts operate at high voltages (85-95 V AC sustained, 15,000+ V ignition pulses) capable of causing serious electrical injury or death. The system must be fully de-energized and any capacitors discharged before servicing. Technician safety demands specific manufacturer procedures for HID system service, including appropriate PPE and waiting periods.

30. A — Skin oils transferred during handling create thermal stress concentration points on halogen bulb glass envelopes, causing premature failure. This is the single most common cause of early halogen bulb

failure. Proper installation technique — handling by base or with clean cloth, and cleaning any finger contact with isopropyl alcohol — prevents this problem.

31. C — The Center High-Mount Stop Lamp functions only during brake pedal application; it is not a tail lamp. This distinguishes it from the other rear lamps which illuminate continuously with headlights. CHMSL has been required on all U.S. passenger cars since 1986 per FMVSS 108 and provides a critical third brake signal visible to following drivers.

32. A — A fast-flashing turn signal on one side is the flasher circuit's deliberate fault indicator, designed to alert the driver that one of the turn signal bulbs on that side has failed. The reduced current load from the burned-out bulb triggers the flasher to accelerate its flash rate. Replacing the failed bulb on the fast-flashing side restores normal flash rate.

33. B — FMVSS 108 establishes comprehensive requirements for vehicle exterior lighting and signaling — headlights, tail lights, signal lamps, brake lights, CHMSL, and side markers. It specifies photometric output, beam patterns, mounting locations, and color requirements. Aftermarket lighting modifications must comply with FMVSS 108 to be legal for road use.

34. D — Modern instrument clusters receive vehicle speed as a network message 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 mechanical cables.

35. B — A warning lamp that illuminates during driving (after bulb check completed) indicates a fault condition has been detected in the system the lamp monitors. The commanding module has detected a problem and requests the cluster illuminate the lamp. Diagnosis requires reading DTCs in the commanding module to identify the specific fault.

36. C — If the sending unit tests correctly and wiring is intact, but the cluster displays incorrect values, the fault is in the cluster itself. Modern clusters include internal electronic processing of fuel gauge signals that can fail independently of external components. Cluster repair or replacement is typically required to address these internal electronic failures.

37. A — Modern clusters store immobilizer authentication data that must match other vehicle modules. A replacement cluster not properly programmed to the vehicle is rejected by the immobilizer, which

denies the engine-enable signal and prevents starting. Programming or pre-programmed cluster supply is required on modern vehicle cluster replacement; a simple physical swap alone is insufficient.

38. D — HUD-equipped vehicles require a special windshield with a wedge-shaped PVB inner layer that prevents ghost imaging. A standard replacement windshield reflects the projected image from both inner and outer glass surfaces, creating the characteristic "ghost" double image. Replacement with the correct HUD-compatible glass is the only fix for this problem.

39. B — If the scan tool shows correct data from the sensor but the DIC displays incorrect information, the data is reaching the DIC correctly but something in its internal processing or display has failed. This isolates the problem to the DIC itself. The sensor and upstream modules are functioning; the DIC's internal electronics are the fault.

40. C — A window that operates from one switch but not from another isolates the fault to the non-working switch's circuit. The motor, regulator, and master switch wiring are all functional since the master switch works. A defective passenger door switch or broken wiring between the switch and door control module is the most likely cause.

41. B — 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, immediately reversing motor direction to prevent injury. This function is federally mandated on auto-up windows and protects occupants from pinching hazards. Current monitoring is the most practical and responsive sensing method.

42. D — Rain-sensing wiper systems use infrared optical sensors that measure changes in total internal reflection from the windshield. Water droplets on the outer glass surface reduce the reflected signal, and the sensor interprets this as precipitation, commanding wiper activation. This is the dominant rain-sensing technology on modern vehicles and requires a clean windshield for proper operation.

43. A — The lock actuator responds to fob commands, confirming the actuator, wiring, and module output are all functional for that command path. A separate switch input path isn't reaching the module. A defective interior lock switch or broken wiring between the switch and the door module is the most likely cause, confirmed by testing the switch circuit.

44. C — Reduced horn volume indicates voltage drop somewhere in the horn circuit — corroded ground, degraded wire, or failing switch contacts. Voltage drop testing from the battery positive to the

horn connector during operation reveals the location of unwanted resistance. The horn itself is rarely the fault when volume is merely reduced; wiring and grounds are typically the cause.

45. D — A fob working at close range but failing at longer distances is the classic signature of a weak battery. The transmitter output is reduced, shortening effective range progressively. This is the simplest and most common RKE complaint; battery replacement almost always restores normal range. Try this before proceeding to receiver or programming diagnosis.

46. A — A defogger grid has multiple parallel horizontal traces; one broken trace disables only that one line while others continue operating normally. 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 paint kits; larger damage requires glass replacement.

47. B — 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 airbag deployment during service causes severe injury. Scanning DTCs, removing the steering wheel, or manually discharging is not sufficient — the full system must be de-energized through the proper battery disconnect procedure.

48. C — Squib connectors include a mechanical shorting bar that automatically shorts the two 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.

49. A — A healthy high-speed CAN bus uses two 120-ohm termination resistors at its physical endpoints. Measured across CAN-H and CAN-L with the ignition off, these two resistors appear in parallel, giving a combined reading of approximately 60 ohms. This is a fundamental CAN diagnostic check; significant deviation indicates missing, damaged, or shorted terminators.

50. D — Gateway module failures affect message translation between network types, causing multiple seemingly unrelated modules to lose communication with each other. Symptoms appear across systems that don't share obvious functional connections — cluster, infotainment, climate, and safety systems can all exhibit issues simultaneously. Recognizing this pattern quickly saves significant diagnostic time on complex vehicles.