PRACTICE EXAM 2: ASE A6 SIMULATION (50 QUESTIONS)

1. A technician is diagnosing a circuit that contains a 24-ohm resistor connected to a 12-volt battery. How much current will flow through the resistor?

A. 0.25 amperes

B. 0.5 amperes

C. 2 amperes

D. 288 amperes

2. An electromagnet is used inside an automotive starter solenoid. Which statement correctly describes how the solenoid creates its magnetic force?

A. Permanent magnets inside the coil housing pull the plunger into engagement

B. A capacitor discharges rapidly to generate a brief pulse of magnetic energy

C. Ambient magnetic fields from the earth align the plunger with the coil

D. Current flowing through the coil winding produces a field that pulls the plunger inward

3. What does the symbol "Ω" represent in electrical equations and schematics?

A. The unit of resistance, measured in ohms

B. Angular velocity in rotating electrical machines

C. The efficiency factor of a power conversion device

D. The ratio of peak to average voltage in an AC signal

4. A lab scope displays the output of a fuel injector primary circuit. A large voltage spike appears the instant the injector is commanded off. This spike is caused by:

A. A failed injector driver transistor shorting to power

B. The rectifier bridge switching polarity in the charging system

C. The collapsing magnetic field in the injector coil inducing a voltage

D. An open in the ground return path for the injector circuit

5. Three identical 6-ohm resistors are connected in parallel across a 12-volt source. The total current drawn from the source is:

A. 6 amperes

B. 2 amperes

C. 18 amperes

D. 0.5 amperes

6. A technician performing a voltage drop test on a starter positive cable connects the voltmeter positive probe to the battery positive post. Where should the negative probe be connected?

A. Directly to the vehicle chassis near the starter mounting

B. To the alternator B+ output terminal during cranking

C. To the battery negative post for a complete circuit reading

D. To the starter solenoid battery terminal during cranking

7. Technician A says that an N-type semiconductor is created by adding impurities with five valence electrons to silicon. Technician B says that an N-type semiconductor's majority charge carriers are positive holes. Who is correct?

A. Both A and B

B. Technician A only

C. Technician B only

D. Neither A nor B

8. A wire-type fusible link has failed. The correct replacement strategy is to:

A. Use a standard wire of the same gauge as the protected circuit's main wire

B. Install a conventional blade fuse of equivalent current rating inline

C. Use fusible link wire of the correct smaller-gauge specification

D. Replace with a larger-gauge wire to prevent repeat failures

9. A solid-state logic probe indicates the presence of voltage on a circuit while drawing only minimal current from the circuit. This is important because:

A. The probe needs to be charged between uses

B. Drawing more current could disrupt or damage electronic module inputs

C. The low draw prevents the vehicle battery from discharging

D. High-current test lights are required by FMVSS safety standards

10. A technician needs to identify a wire in a harness by color code. The wire is labeled "GN/WH." This means the wire has:

A. A green base color only with no tracer stripe

B. A white base color with a green secondary stripe

C. A green base color with a white tracer stripe

D. Two separate wires bundled together, one green and one white

11. Two DC currents of 3 amperes and 2 amperes flow into the same node in a parallel branch. By Kirchhoff's current law, the current flowing out of the node must equal:

A. 1 ampere

B. 6 amperes

C. 2.5 amperes

D. 5 amperes

12. A 20-amp mini-blade fuse is color-coded which of the following?

A. Yellow

B. Red

C. Orange

D. Blue

13. When reading a connector face view on a wiring diagram, the technician must verify the view orientation because:

A. Connector face views are always drawn from both sides simultaneously

B. Connector symbols change depending on whether the module is powered

C. Pin numbering is a mirror image between the wire side and terminal side

D. Different manufacturers assign different colors to identical pin positions

14. An AGM battery is characterized by:

A. Free liquid electrolyte that requires periodic topping off with distilled water

B. Electrolyte absorbed into compressed fiberglass mats between the plates

C. A dry cell chemistry identical to consumer alkaline batteries

D. A lithium-iron-phosphate chemistry with per-cell management

15. A technician measures the open-circuit voltage of a flooded lead-acid battery and reads 12.2 volts after adequate rest. This indicates the battery is:

A. Fully charged and ready for service

B. Overcharged and must be disconnected immediately

C. Defective and must be replaced

D. At approximately 50 percent state of charge

16. Technician A says that a conductance tester can provide meaningful state-of-health results on a battery that is not fully charged. Technician B says that a traditional carbon-pile load tester requires a fully charged battery for the test to be valid. Who is correct?

A. Both A and B

B. Technician A only

C. Technician B only

D. Neither A nor B

17. A starter solenoid makes an audible click but the starter motor does not rotate. Battery voltage is 12.4 volts. The MOST likely cause is:

A. A completely discharged battery producing insufficient voltage

B. A failed neutral safety switch preventing engagement

C. Burned or eroded solenoid main contacts unable to carry current

D. A broken timing belt preventing crankshaft rotation

18. An overrunning clutch drive in a starter is designed to:

A. Allow the pinion to engage the flywheel with maximum force

B. Protect the starter when engine RPM exceeds starter drive speed

C. Provide additional torque during cold-weather starting conditions

D. Maintain pinion engagement for several seconds after ignition release

19. Reserve Capacity (RC) on a battery is defined as:

A. The number of minutes a battery can supply 25 amperes before voltage drops to 10.5 volts

B. The peak current the battery can deliver for a full minute at room temperature

C. The amp-hour capacity divided by the battery's internal resistance at rest

D. The minimum voltage the battery maintains during engine cranking

20. A vehicle has been parked for three days and will not start due to a discharged battery. The battery passes state-of-health testing after recharging. The technician should next:

A. Replace the battery anyway as a precaution

B. Recommend driving the vehicle daily to keep the battery charged

C. Install a higher-CCA battery for better reserve capacity

D. Perform a parasitic draw test to identify excessive key-off current draw

21. When jump-starting a vehicle, the technician should make the final ground connection:

A. At a clean metal surface on the engine block of the dead vehicle, away from the battery

B. Directly to the negative post of the discharged battery for best conductivity

C. Between the two batteries at their midpoint using a short jumper

D. On any painted body panel to prevent short circuits to the frame

22. A vehicle with a start-stop system requires a replacement battery. The correct replacement is:

A. A conventional flooded battery of matching group size

B. An AGM or EFB battery matching the original specification

C. A deep-cycle marine battery for extended service life

D. Any 12-volt battery with equal or greater CCA rating

23. An alternator's rotor is an electromagnet rather than a permanent magnet because:

A. Permanent magnets are too expensive for mass-production use

B. Iron rotors are lighter than neodymium permanent magnet rotors

C. Electromagnets produce stronger fields than any permanent magnet available

D. Controlling field current allows regulation of alternator output voltage

24. Excessive AC ripple measured at the battery terminals during alternator operation typically indicates:

A. One or more failed rectifier diodes in the alternator

B. A loose or slipping drive belt on the accessory system

C. An overcharging voltage regulator requiring replacement

D. A shorted field coil drawing excessive current continuously

25. A computer-controlled charging system commands 13.2 volts at highway cruise despite the battery having been recently discharged. The technician should:

A. Replace the alternator immediately for inadequate output

B. Check for a blown fuse in the charging control circuit

C. Use a scan tool to verify the commanded voltage and battery state data

D. Increase engine RPM and retest the voltage at idle position

26. A full-field test on a legacy externally regulated alternator is performed to:

A. Determine if the battery is capable of accepting charge from the alternator

B. Bypass the regulator to test whether the alternator can produce rated output

C. Verify proper drive belt tension under maximum charging load

D. Measure the current draw of the vehicle's overall electrical system

27. Technician A says that a computer-controlled charging system may intentionally reduce charging voltage during regenerative deceleration. Technician B says that under all operating conditions, charging voltage must remain between 13.8 and 14.7 volts to be considered normal. Who is correct?

A. Technician A only

B. Both A and B

C. Neither A nor B

D. Technician A only is correct; Technician B is incorrect because modern systems vary voltage intentionally

28. LED headlight assemblies typically include a dedicated driver module that:

A. Amplifies the 12-volt supply to produce the high voltage required for LED arcs

B. Converts vehicle 12-volt power into the constant current required by the LEDs

C. Replaces the need for separate turn signal bulbs in modern assemblies

D. Filters out all AC ripple from the vehicle's charging system

29. The principle of total internal reflection is used in which automotive lighting system?

A. HID xenon ballast ignition circuits

B. LED matrix beam-steering optics

C. Rain-sensing wiper windshield sensors

D. Halogen bulb filament heat management

30. A turn signal on one side of a vehicle flashes at twice the normal rate. The MOST likely cause is:

A. A failed hazard flasher module affecting only one side

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

C. A short to ground in the opposite side's signal circuit

D. An open ground at the center high-mount stop lamp

31. Installing an aftermarket HID bulb retrofit kit in a housing designed for halogen is generally:

A. A permitted upgrade that enhances road safety

B. Approved by FMVSS 108 as long as the bulb is DOT marked

C. Illegal for road use because it produces a non-compliant beam pattern

D. Recommended by most vehicle manufacturers for improved visibility

32. A clock spring assembly is located in:

A. The steering column between the steering wheel and fixed column components

B. The passenger airbag module mounted in the dashboard

C. The headlight switch housing behind the instrument panel

D. The battery disconnect switch on hybrid and electric vehicles

33. Daytime running lights (DRLs) on a modern vehicle are typically:

A. Operated only when the headlight switch is in the full ON position

B. Activated by ambient light sensors when brightness drops below a threshold

C. Wired in series with the high-beam headlights for full brightness

D. Automatically illuminated whenever the engine is running, regardless of switch position

34. An analog fuel gauge reads full continuously, even when the tank is nearly empty. The MOST likely cause is:

A. A worn resistive element in the sending unit causing erratic readings

B. A shorted sending unit wire to ground producing a maximum-level signal

C. A BCM software fault requiring immediate reprogramming

D. A failed low-fuel warning lamp circuit in the cluster

35. On a modern reconfigurable TFT instrument cluster, engine RPM is displayed based on:

A. A dedicated tachometer signal wire running directly from the ignition coil to the cluster

B. A mechanical cable connecting the distributor shaft to the cluster pointer

C. An analog voltage from the engine speed sensor hardwired to the gauge

D. A digital CAN message broadcast by the engine control module

36. Technician A says that a warning lamp that stays illuminated after the key-on bulb check indicates a fault in the system the lamp monitors. Technician B says that a lamp that fails to illuminate during bulb check indicates a failure of the lamp circuit itself. Who is correct?

A. Technician A only

B. Technician B only

C. Both A and B

D. Neither A nor B

37. A vehicle's head-up display (HUD) shows a ghost image above the primary display. The MOST likely cause is:

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

B. A HUD projector lamp nearing end of service life

C. A dirty windshield area where the HUD image is projected

D. A software calibration error in the HUD control module

38. Replacing an instrument cluster on a modern vehicle generally requires:

A. Simply transferring mounting hardware and connectors from the old cluster

B. Disconnecting the battery for at least 30 minutes before installation

C. Performing a gauge sweep calibration using a scan tool output command

D. Programming the cluster with odometer, configuration, and immobilizer data

39. An odometer reading on a replacement cluster must be:

A. Left at zero and documented as a new cluster installation

B. Programmed to match the original cluster's mileage per federal law

C. Multiplied by a factor based on vehicle age and market region

D. Automatically updated by the engine control module on first start

40. A power window operates only in the up direction but not in the down direction. The MOST likely cause is:

A. A failed down contact in the window switch or a break in the down-direction wiring

B. A completely failed window motor that cannot rotate in either direction

C. A broken window regulator cable inside the door panel assembly

D. A discharged battery unable to supply sufficient current for both directions

41. Modern power window auto-up pinch protection operates by:

A. Using infrared sensors across the window opening to detect obstructions

B. Monitoring motor current for spikes indicating mechanical obstruction

C. Measuring force on the window glass through piezoelectric transducers

D. Timing the total duration of the up-travel cycle against a stored limit

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

A. A failed door lock actuator with one stuck relay contact

B. A blown fuse shared by both fob and switch circuits

C. A defective body control module output driver stage

D. A failed door switch or break in its signal wire to the module

43. A vehicle's windshield washer pump does not operate when the washer switch is activated. The technician should FIRST:

A. Verify fluid presence in the washer reservoir before any electrical testing

B. Disassemble the pump motor for internal inspection and brush replacement

C. Scan the body control module for washer-circuit DTCs immediately

D. Replace the washer switch on the wiper stalk as a precautionary measure

44. A rain-sensing wiper system uses what physical principle to detect precipitation?

A. Piezoelectric transducers mounted on the windshield measure droplet impacts

B. Ultrasonic frequency changes caused by water on the glass surface

C. Reduction in infrared total internal reflection when water droplets are present

D. Change in electrical capacitance between two electrodes embedded in glass

45. A horn that sounds continuously even with the steering wheel button not pressed is MOST likely caused by:

A. A burned-out horn relay preventing the circuit from opening

B. A disconnected ground wire at the horn mounting bracket

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

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

46. A remote keyless entry fob works intermittently at short range but not at longer distances. The MOST likely cause is:

A. A defective radio frequency receiver in the vehicle's RKE module

B. A weak or depleted battery inside the key fob

C. An unsynchronized rolling code between the fob and vehicle

D. Radio frequency interference from nearby cellular towers

47. A rear defogger grid has one horizontal line that does not heat while the others operate normally. The MOST likely cause is:

A. A failed defogger relay reducing power to the entire grid

B. A blown defogger fuse protecting the complete circuit

C. A broken trace in the specific non-heating line on the glass

D. A degraded ground connection at the defogger switch

48. A healthy high-speed CAN bus waveform displays CAN-High and CAN-Low signals that are:

A. Mirror images of each other around a 2.5-volt reference

B. Identical in both voltage level and polarity at all times

C. Phased 90 degrees apart with equal peak-to-peak amplitudes

D. Independent signals showing completely unrelated data patterns

49. The LIN (Local Interconnect Network) protocol operates using:

A. A differential twisted-pair at 500 kilobits per second

B. A single wire plus ground using master-slave communication

C. A fiber-optic cable for electromagnetic interference immunity

D. Multiple parallel conductors with dedicated timing signals

50. Before performing any service involving supplemental restraint system components, the technician MUST:

A. Disconnect only the airbag connector while leaving the battery connected

B. Scan the SRS module for DTCs with ignition on before starting work

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

D. Follow the manufacturer-specified SRS disabling procedure with required wait period

Practice Exam 2: Answer Key and Explanations

1. B — Applying Ohm's Law, I = E ÷ R, so 12 volts ÷ 24 ohms = 0.5 amperes. This calculation is fundamental to every automotive diagnostic task where current must be determined from known voltage and resistance. Recognizing the three forms of Ohm's Law is among the most heavily tested concepts on the A6 exam.

2. D — An electromagnetic solenoid creates its pulling force through current flowing in the coil winding, which produces a magnetic field that draws the ferromagnetic plunger inward. This same principle operates every automotive solenoid including starter, fuel injector, and transmission shift solenoids. Without current flow through the coil, no magnetic field exists and the return spring keeps the plunger retracted.

3. A — The Greek letter omega (Ω) is the universal symbol for ohms, the unit of electrical resistance, and appears on every DMM selector dial and throughout automotive wiring diagrams. Fluency with this symbol along with V (volts), A (amperes), and W (watts) is essential for reading any electrical specification. The symbol appears constantly in service information and test equipment.

4. C — When current to an inductive load like an injector coil is interrupted, the collapsing magnetic field induces a large voltage spike of opposite polarity in the same coil — typically 60 volts or higher on

a fuel injector. This "inductive kick" is why clamping diodes are placed across relay and solenoid coils. The spike is a normal characteristic of inductive switching, not a fault.

5. A — Three identical 6-ohm resistors in parallel give 6 ÷ 3 = 2 ohms total resistance. Total current equals 12 volts ÷ 2 ohms = 6 amperes drawn from the source. This demonstrates how parallel loads combine to decrease total resistance and increase current demand, a key concept for understanding automotive electrical bus loading.

6. D — Voltage drop testing across the positive battery cable measures the voltage lost along that cable during current flow. The positive probe goes to the upstream end (battery positive post) and the negative probe to the downstream end (starter solenoid battery terminal) during cranking. Other probe positions measure different portions of the circuit and produce misleading results.

7. B — N-type silicon is produced by doping pure silicon with elements containing five valence electrons (phosphorus, arsenic, or antimony). The extra electron from each dopant atom becomes a free charge carrier, making electrons (negative charges) the majority carriers. P-type silicon is what has holes as majority carriers, so Technician B is incorrect.

8. C — Fusible links are intentionally undersized compared to the circuit they protect, using smaller-gauge fusible link wire with special high-temperature insulation. Replacing with standard wire or a larger gauge removes the protection, allowing the main harness to burn during a fault. Always use fusible link wire of the correct specification or the cartridge-style equivalent.

9. B — Logic probes typically draw less than 1 milliampere, while conventional incandescent test lights draw 150–300 milliamperes. That higher current draw is sufficient to damage sensor output drivers, load signal lines, or destroy electronic control module inputs. This is why logic probes are mandatory for signal-line diagnosis on modern vehicles.

10. C — The two-letter color code convention lists the base color first and the tracer stripe second. "GN/WH" means a green base with a white tracer stripe running along the length. This notation appears throughout service information and must be read accurately to identify the correct wire within a harness bundle.

11. D — Kirchhoff's current law states that the total current entering a node must equal the total current leaving it. If 3 amperes plus 2 amperes enter the node (5 amperes total), 5 amperes must flow out. This

principle underlies current distribution analysis in parallel circuits and modern vehicle electrical bus architecture.

12. A — The SAE color code for a 20-amp fuse is yellow across all standard blade fuse form factors (mini, standard, and maxi). Other common ratings: 5A orange, 7.5A brown, 10A red, 15A blue, 25A clear, 30A green. Memorizing the color code allows rapid visual verification of fuse rating in the fuse box.

13. C — Connector face views on wiring diagrams may show either the wire side or the terminal side, and pin numbering is a mirror image between the two. Back-probing the wrong cavity because of misread view orientation is a common diagnostic error. Always check the diagram's orientation label before counting cavities from either end.

14. B — AGM (Absorbed Glass Mat) batteries replace the free liquid electrolyte of flooded batteries with electrolyte absorbed into compressed fiberglass mats between the plates. The chemistry remains lead-acid; only the physical form of the electrolyte changes. This gives AGM batteries superior vibration resistance, spill-proof construction, and better deep-cycle performance than flooded designs.

15. D — A flooded battery reading 12.2 volts at rest is at approximately 50 percent state of charge, not defective. Recharging to full and retesting is the correct next step; only a battery that fails to reach 12.6 volts after full charging is defective. Many batteries are discarded unnecessarily because a discharged state is mistaken for failure.

16. A — Conductance testers measure internal battery condition electrically, so they produce valid state-of-health results even on partially discharged batteries. Carbon-pile load testers require a fully charged battery because they work by drawing rated current and observing voltage response, which is meaningless on a depleted battery. Both technicians correctly describe their respective test requirements.

17. C — A click with no cranking indicates the solenoid is engaging but the main contacts cannot carry starter current. Burned or eroded contacts have high resistance that cannot support the 150–300 ampere cranking current required. Solenoid replacement (or complete starter replacement where the solenoid is not serviced separately) is the repair.

18. B — The overrunning (one-way) clutch allows the pinion to free-wheel when the engine starts and spins faster than the starter. Without this clutch, the engine would drive the starter above its safe

operating RPM and destroy it. The clutch is essential for protecting modern starters during the transition from cranking to engine-running speed.

19. A — Reserve Capacity 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 charging fails. Higher RC provides more runtime on battery alone after an alternator failure.

20. D — A battery that repeatedly discharges despite testing good after recharging typically indicates excessive parasitic draw — current drawn by modules that are not entering their low-power states properly. A current clamp around the negative battery cable after the vehicle has slept will reveal any abnormal current draw that needs diagnosis.

21. A — Making the final jump-start connection at the engine block (away from the discharged battery) prevents any spark from igniting hydrogen gas that may be accumulated around a recently discharged and possibly gassing battery. Direct connection to the dead battery's negative post places the spark directly where gas concentration is highest. This is a safety-critical procedural detail.

22. B — Start-stop systems subject the battery to repeated deep cycles during engine-off periods and require batteries designed for that duty. Conventional flooded batteries fail prematurely in this service. The OEM specification is typically AGM or EFB; installing either matches the vehicle's battery management strategy and provides expected battery life.

23. D — Using an electromagnet as the rotor allows the voltage regulator to vary field current, which in turn varies the magnetic field strength and the voltage induced in the stator. This is how output voltage is regulated under changing load and RPM conditions. Permanent magnet rotors cannot be regulated this way and are only used in specialized alternator designs.

24. A — The rectifier bridge converts the alternator's three-phase AC into DC. One or more failed diodes (open or shorted) leaves substantial AC ripple on the output, typically 500 mV or higher compared to the healthy 50 mV or less. Excessive ripple also damages vehicle electronics over time, making prompt diagnosis important.

25. C — A computer-controlled charging system may correctly command reduced voltage if it determines the battery has reached full charge, the battery temperature is elevated, or other strategy conditions apply. Scan tool access reveals the commanded voltage, sensed battery state, and any DTCs

before condemning the alternator. Many "undercharging" complaints on modern vehicles are actually normal adaptive behavior.

26. B — Full-field testing applies direct battery voltage to the alternator field winding, bypassing the regulator and forcing maximum output. This confirms whether the alternator itself is capable of rated output or whether the regulator is the fault. The test is specific to legacy externally regulated systems and is generally not possible on modern computer-controlled alternators.

27. D — Modern computer-controlled charging systems intentionally vary voltage across the operating range, sometimes above 14.7 volts during regenerative deceleration and sometimes below 13.8 volts during float mode when the battery is full. Technician B's statement applying a fixed voltage window to all conditions is outdated and incorrect for modern systems requiring scan tool verification.

28. B — LED headlights require precise constant current to operate within their specified output and longevity window, which a direct 12-volt supply cannot provide. The driver module converts vehicle power into the constant current each LED requires. A failed driver module produces a non-functioning headlight even when the LEDs themselves are intact.

29. C — Rain-sensing wiper systems use an infrared sensor that projects light into the windshield at an angle producing total internal reflection. When water droplets on the outer surface disrupt that reflection, the returning signal decreases, and the sensor interprets this as precipitation. The system then activates wipers accordingly.

30. B — A fast-flashing turn signal on one side is the flasher circuit's deliberate fault indicator, designed to alert the driver that a bulb 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 restores normal flash rate.

31. C — HID retrofit kits installed in housings designed for halogen produce non-compliant beam patterns that typically project glare toward oncoming traffic. This violates FMVSS 108 and most state equipment codes. The housing optics were engineered for the specific filament geometry of the halogen bulb; an HID arc source produces radically different light distribution.

32. A — The clock spring is a coiled flat cable assembly in the steering column that maintains electrical continuity between the rotating steering wheel and the fixed column. It carries signals for horn, airbag, cruise control, steering wheel switches, and other functions. Clock spring failures produce intermittent horn, airbag warning lamp, and steering wheel switch symptoms simultaneously.

33. D — Daytime running lights illuminate automatically whenever the engine is running, regardless of the headlight switch position, making the vehicle visible to other drivers during daytime operation. This is mandatory in Canada and increasingly common elsewhere. DRL implementations vary (dedicated lamps, reduced-voltage headlights, or fog lamp repurposing), but all activate with engine running.

34. B — A sending unit signal wire shorted to ground produces a resistance value that the cluster interprets as full-tank, causing the gauge to show full continuously. This failure mode is distinct from a worn sending unit (which produces erratic readings) or an open circuit (which typically produces empty readings). Wiring inspection between sender and cluster identifies the short.

35. D — Modern reconfigurable clusters receive virtually all operating data over serial networks rather than through direct sensor wiring. The engine control module reads the crankshaft position sensor, calculates RPM, and broadcasts the value on the CAN bus, where the cluster receives it and renders the tachometer display. This architecture allows centralized data processing and reduced wiring complexity.

36. C — A warning lamp illuminated after bulb check indicates a fault in the monitored system — the commanding module is actively requesting the lamp remain on because the condition persists. A lamp that fails to illuminate during bulb check indicates a lamp circuit problem (bulb, LED, or driver fault). Both technicians correctly describe these distinct diagnostic signatures.

37. A — HUD-equipped vehicles require special windshields with a wedge-shaped PVB inner layer that reflects the projected image at the correct angle. A standard replacement windshield reflects the 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.

38. D — Modern clusters store vehicle-specific configuration, odometer readings, and immobilizer authentication data. A replacement cluster must be programmed with the original vehicle's data, or the new cluster will produce immobilizer rejection (vehicle won't start), incorrect odometer display, or feature mismatches. Simple physical swap alone is not sufficient on modern vehicles.

39. B — Federal law prohibits odometer tampering and requires mileage accuracy at vehicle sale. When replacing a cluster, the original odometer reading must be programmed into the new cluster per manufacturer procedures. Failure to preserve the reading creates legal exposure and may require documented disclosure of the mileage adjustment.

40. A — The window moves in one direction but not the other, indicating the circuit for one direction is functional while the other is broken. The switch has separate contacts for up and down commands; a failed down contact or a break in the down-direction wiring (between switch and motor) explains why the down function alone fails.

41. B — Modern pinch-protection monitors the window motor current during up-travel through the H-bridge driver. When an obstruction increases mechanical resistance, motor current spikes predictably, and the module detects the spike and immediately reverses motor direction. This function is federally mandated on auto-up windows for occupant safety.

42. D — The lock actuator responds to fob commands, so the module, relay, actuator, and fuse all function correctly. The door switch is a separate input path that isn't reaching the module. A defective door switch or broken wire between switch and module is the most likely cause, confirmed by testing the switch circuit with a voltmeter.

43. A — Before diagnosing electrical faults in a washer system, always verify there is actually fluid in the reservoir. A customer report of "washer won't work" is frequently resolved by topping off the fluid — a 30-second fix. Skipping this basic check and proceeding to electrical testing wastes time on circuits that may be operating correctly.

44. C — Rain sensors project infrared light into the windshield at an angle that produces total internal reflection off the outer glass surface. Water droplets on the outer surface disrupt this reflection, allowing some light to escape through the droplets. The sensor measures the reduction in reflected signal and interprets it as precipitation, then commands wiper activation.

45. D — A continuously sounding horn has its control circuit continuously grounded. A shorted horn switch or short to ground in the switch wiring completes the circuit even with the button released. Disconnecting the horn relay or the switch isolates the fault location. A burned-out relay produces no operation at all, not continuous operation.

46. B — A fob working at short range but failing at longer distances is the classic signature of a weak battery in the fob — the transmitter output is reduced, shortening the effective range. Battery replacement is the first and simplest repair. Unsynchronized rolling codes cause complete failure, not range reduction.

47. C — A defogger grid has multiple parallel traces; one broken trace disables only that one line while the others continue operating normally. A voltmeter walking along the broken trace locates the break by showing where voltage drops abruptly. Small breaks can be repaired with conductive silver-ceramic paint kits.

48. A — High-speed CAN uses differential signaling with CAN-H and CAN-L as mirror images of each other around a 2.5-volt reference. When one goes to 3.5 V, the other goes to 1.5 V (and vice versa). This differential transmission provides immunity to common-mode noise because interference affects both wires equally and cancels in the differential signal.

49. B — LIN is a low-cost, single-wire network operating at 1–20 kbit/s using master-slave communication. One master module polls slaves by sending header messages; slaves respond only when addressed. This simple architecture is used for window switches, mirror motors, and other low-bandwidth applications where CAN would be unnecessarily complex and expensive.

50. D — Every SRS has a manufacturer-specified disabling procedure including battery disconnection, a waiting period (typically 1–10 minutes) for internal capacitors to discharge, and verification that the system is disabled. Accidental airbag deployment during service can cause severe injury. Shortcuts like disconnecting only the airbag connector or scanning DTCs only are insufficient and dangerous.