PRACTICE EXAM 17: ASE L3 SIMULATION (45 Questions)

Time Limit: 2 hours | Passing target: 80% or higher on simulation practice

1. A technician with an implanted cardiac pacemaker is working in a shop that services hybrid vehicles. The technician should:

A. Continue working normally because pacemakers are not affected by hybrid vehicle electrical systems

B. Wear extra layers of clothing as additional shielding from electromagnetic field exposure during work

C. Perform HV work only when the inverter is energized at low load to reduce field strength near the body

D. Avoid working on energized HV components and consult their physician about workplace exposure limits

2. A "hot stick" or insulated rescue hook is used in hybrid HV emergencies to:

A. Discharge stored capacitor energy by shorting the HV bus to chassis ground through a load resistor

B. Move a person who is in contact with energized HV without the rescuer becoming part of the circuit

C. Measure HV bus voltage from a safe distance using an insulated probe at the end of the stick

D. Test the insulation resistance of HV cables while the system is fully energized at operating voltage

3. An insulated clamp meter rated CAT III 1000V is used on a hybrid to measure:

A. Current flowing through an HV cable without breaking the circuit, using magnetic-field sensing

B. The insulation resistance between an HV conductor and chassis ground at 500 volts DC test voltage

C. The voltage between an HV bus conductor and chassis ground while the system is fully energized

D. The internal resistance of individual HV battery cells while the pack is disassembled for service

4. A 48-volt mild hybrid system differs from a high-voltage hybrid in that:

A. The 48-volt system can drive the vehicle in EV-only mode at all highway speeds without any engine input

B. Orange HV cables are used throughout the 48-volt system to identify the dangerous voltage carried in them

C. The voltage is below the typical shock-hazard threshold and PPE requirements are reduced compared to full hybrids

D. The 48-volt system always uses a series hybrid configuration without any mechanical engine-to-wheel connection

5. A belt-starter-generator (BSG) on a mild hybrid replaces the:

A. Conventional crankshaft itself, providing direct electromagnetic torque to the engine output shaft

B. Hydraulic torque converter inside the automatic transmission housing on the input shaft side

C. Final drive ring gear on the differential to provide regenerative braking through the rear axle

D. Conventional alternator and starter motor, performing both functions plus mild hybrid assist

6. A hybrid vehicle's 12-volt auxiliary battery is dead and the vehicle will not power up. The proper jump-start procedure is to:

A. Connect a 12-volt jumper pack to the HV battery main terminals to bring up the entire hybrid system

B. Connect 240-volt AC power from a Level 2 EVSE to the charging port to wake the hybrid system up

C. Connect a 12-volt jumper pack to the designated jump-start terminals or directly to the 12V battery posts

D. Run the engine of another vehicle nearby to inductively recharge the dead hybrid through magnetic coupling

7. The age of a hybrid HV battery pack can usually be determined by:

A. A date code stamped on the pack label, often combined with the battery's serial number from the OEM

B. Counting the number of regenerative braking events the BMS has recorded in non-volatile module memory

C. Measuring the cell voltage across each module and comparing the value to a manufacturer aging chart

D. Reading the battery temperature at idle and matching it to a published battery age estimation table

8. The magnetic field around an energized hybrid drive motor:

A. Is strong enough to permanently magnetize the technician's standard hand tools during normal operation

B. Can interfere with electronic devices, credit cards, and some medical implants near the energized motor

C. Has no effect on any external object because the motor's magnetic field is contained inside the housing

D. Reduces fuel economy by inducing eddy currents in the technician's body during operation near the vehicle

9. The metallic shielding around HV cables on a hybrid vehicle helps reduce:

A. The total weight of the orange high-voltage cable assembly carried through the vehicle's body structure

B. Voltage drop along the length of the cable when carrying maximum current from battery to inverter loads

C. Mechanical abrasion of the inner conductors against the surrounding rubber outer insulation jacket material

D. Electromagnetic interference (EMI) radiated by the high-frequency switching currents inside the cable

10. Transporting an undamaged hybrid HV battery pack by ground requires:

A. Compliance with DOT 49 CFR regulations for lithium-ion or other applicable chemistry shipping requirements

B. No special precautions because batteries are exempt from hazardous materials shipping requirements at all

C. Only insurance coverage at the shipper's election with no documentation or labeling requirements needed

D. Shipping by air freight only since ground transport is not allowed for any high-voltage battery type at all

11. A rubber grommet around an HV cable passing through a sheet metal panel on a hybrid vehicle:

A. Provides electrical conductivity between the cable shielding and the chassis ground at the panel pass-through

B. Acts as the primary insulation barrier between the HV conductor and any potential body contact during operation

C. Protects the cable from chafing against the panel edge that could compromise the cable's insulation over time

D. Allows controlled airflow into the cable shielding to keep the conductor cool during high-current operation

12. A hybrid vehicle's electric power steering system uses a torque sensor that measures:

A. The amount of twisting force the driver applies to the steering wheel through the steering column shaft

B. The hydraulic pressure inside the rack assembly during cornering at low vehicle speeds during turns

C. The lateral acceleration of the vehicle to determine if power steering assist is needed in that condition

D. The vehicle's forward speed only, which is used to taper steering assist as vehicle speed increases higher

13. A hybrid brake-by-wire system's pedal travel sensor reports its signal to the:

A. Engine control module so that throttle position can be reduced when the brake pedal is depressed firmly

B. Brake/regen control module so that regenerative and friction braking can be blended to match driver demand

C. Hybrid control module to inhibit the engine auto-stop function whenever the brake pedal is applied lightly

D. Anti-lock brake controller exclusively, with no input shared with the regenerative braking control system

14. A hybrid vehicle's steering angle sensor is most commonly used by the:

A. Hybrid control module to determine when to switch from EV-only mode to engine-assisted operation modes

B. Inverter to adjust the three-phase output to MG2 based on the angle of the wheels at any given moment

C. DC-DC converter to control the 12-volt battery charging rate during low-speed cornering maneuvers always

D. ABS/ESC system for vehicle stability control, with the steering position being compared to vehicle yaw

15. The proper test points for measuring HV bus voltage on a typical hybrid vehicle are:

A. The 12-volt battery positive and negative terminals while the HV system is in ready mode for testing

B. The motor's three-phase terminals at the transaxle case during steady cruise at highway speed conditions

C. The OEM-designated HV test points or terminals at the inverter, used with a CAT III 1000V meter

D. Any orange cable along the HV path by piercing the insulation carefully with a sharp test probe tip

16. A megohmmeter test on a hybrid drive motor reads 50 megohms between the windings and the case. This reading indicates:

A. Failed insulation requiring immediate motor replacement before the vehicle can be safely returned to service

B. Acceptable insulation, since OEM minimums are typically 1 to 10 megohms for a healthy motor at room temperature

C. A short circuit between phases within the motor windings that will require disassembly to repair correctly

D. A wiring connection problem at the megohmmeter test leads that requires verification of the test setup

17. End-of-life hybrid HV batteries in the United States are regulated for disposal under:

A. EPA Universal Waste Rules and the Resource Conservation and Recovery Act (RCRA) requirements

B. The Department of Transportation (DOT) only, with no other federal agencies involved in disposal regulations

C. State motor vehicle inspection regulations only, with no federal involvement in the disposal of these batteries

D. The Federal Communications Commission (FCC) under provisions for electronic waste containing radio components

18. EPA regulations on refrigerant handling apply to hybrid vehicle A/C systems:

A. Only when the vehicle is driven across state lines for service work performed at a destination shop

B. Only on plug-in hybrids that have charging ports, since charging ports are subject to additional regulations

C. The same as on conventional vehicles, requiring EPA 609 certification for any refrigerant handling work

D. With no refrigerant regulations whatsoever, since hybrid A/C systems use less refrigerant than conventional systems

19. The 12-volt auxiliary battery on a hybrid vehicle is normally charged by:

A. The DC-DC converter, which steps down HV bus voltage to approximately 14 volts for the 12-volt system

B. A conventional belt-driven alternator that operates only when the internal combustion engine is running

C. The regenerative braking system, which sends current directly to the 12-volt battery during deceleration

D. A separate 12-volt-only charging port that requires periodic external charging from a wall charger setup

20. On most plug-in hybrids, the charging port is located:

A. Inside the engine compartment near the air intake to allow easy access during routine vehicle service

B. Inside the trunk near the spare tire well so that the charging cable can be stored together with the vehicle

C. Underneath the vehicle near the HV battery pack to minimize the length of internal HV cable runs between

D. On the side of the vehicle behind a flap, allowing convenient external access for the charging cable

21. The malfunction indicator lamp (MIL) on a hybrid vehicle's dash:

A. Is replaced by the hybrid warning lamp, which serves the same function exclusively on hybrid vehicles

B. Functions similar to a conventional vehicle, but a separate "Check Hybrid System" lamp may also be present

C. Only illuminates for HV system faults and never for conventional engine or emissions-related fault codes

D. Cannot be cleared with a generic scan tool because hybrid vehicles use a proprietary diagnostic protocol

22. A hybrid vehicle has set a P0AA6 code (HV system isolation fault). This code indicates that:

A. The 12-volt auxiliary battery has dropped below the minimum threshold for hybrid system operation at startup

B. The HV battery pack is at end-of-life and requires immediate replacement before any further driving can occur

C. The isolation monitor has detected a leakage path between an HV conductor and the chassis ground reference

D. The inverter has experienced an internal overcurrent event during the last engine start-up sequence at idle

23. A hybrid HV battery test station is used in a shop to:

A. Charge a customer's HV battery from a depleted state using AC power through the J1772 charging connector

B. Simulate driving conditions with the battery installed in the vehicle to observe system behavior under load

C. Detect refrigerant leaks in the A/C system that may be related to HV battery thermal management problems

D. Cycle and analyze a removed HV battery pack to evaluate cell condition, capacity, and overall pack health

24. After replacing an HV cable on a hybrid vehicle, the technician should perform:

A. An isolation resistance test on the new cable and a complete HV system scan before releasing the vehicle

B. A road test only, without any electrical verification of the cable since visual inspection is sufficient enough

C. A 12-volt battery reset by disconnecting the battery for 30 minutes to clear any stored fault codes from

D. No additional testing because the new cable is OEM and verified at the factory before shipment to dealers

25. A hybrid vehicle's drive motor is being inspected on the bench after removal. To perform a back-EMF test, the technician should:

A. Apply 12 volts DC to one phase and measure the voltage at the other two phases for proper conduction

B. Connect the motor to a battery charger and observe the current draw during a normal charging session test

C. Spin the motor with another motor or by hand and measure the three-phase AC voltage produced as output

D. Measure the resistance between each phase and the motor case using a standard digital multimeter on ohms

26. On a hybrid vehicle, the air bag system:

A. Operates only on the HV system and requires HV power to deploy in the event of a vehicle collision

B. Operates on the 12-volt system independently of the HV system, but a crash may trigger HV shutdown

C. Cannot be serviced unless the HV service plug is removed first to prevent any electrical interference

D. Uses the orange wiring color code throughout because air bag deployment circuits are considered HV

27. On most hybrid vehicles, the main HV battery contactors are normally:

A. Closed continuously whenever the vehicle is parked, even with the ignition turned off completely now

B. Closed at all times during driving, regardless of whether the system is in ready mode or shutoff state

C. Opened by the technician manually using a special tool inserted through a hole in the battery enclosure

D. Open by default and only close when the hybrid control module commands them closed during startup

28. Many hybrid vehicles produce a slight "creep" forward when in drive with the brake released, even though no engine is running. This creep is produced by:

A. The drive motor (MG2) supplying small amounts of torque to the wheels, simulating a torque converter

B. The 12-volt battery powering the drive motor through a small relay circuit at low driver demand levels

C. A small mechanical clutch that automatically engages to creep the vehicle from a complete stop position

D. A failed regenerative braking circuit that allows the wheels to roll free without any electrical resistance

29. After draining and refilling a hybrid vehicle's power electronics coolant loop, the technician must:

A. Drive the vehicle for 100 miles to allow the system to bleed itself through normal operation cycles

B. Follow the OEM-specified vacuum-fill or scan-tool-commanded purge procedure to remove all air pockets

C. Run the engine at high RPM for several minutes to force coolant through the inverter passages quickly

D. Disconnect the upper coolant hose temporarily to allow trapped air to escape from the coolant reservoir

30. Moisture entering a hybrid HV battery pack or inverter is dangerous because it:

A. Will freeze in cold weather and crack open the orange HV cable insulation along the entire cable length

B. Reduces the isolation resistance between HV conductors and chassis ground, increasing shock hazard

C. Causes the air-conditioning system refrigerant to condense back into liquid form at higher system pressure

D. Always evaporates harmlessly within 10 minutes of entering the sealed HV components on the vehicle

31. The hybrid inverter assembly on a typical Toyota Prius is located:

A. Under the hood in a metal box with prominent orange high-voltage warning labels on the cover

B. Inside the cabin under the driver's seat to maintain easy access for routine maintenance procedures

C. In the trunk behind the rear seat, integrated with the HV battery pack as a single combined unit

D. Underneath the vehicle near the rear axle, mounted directly to the underside of the rear cargo floor

32. A hybrid vehicle has multiple coolant reservoirs. The technician must:

A. Use only the engine coolant reservoir level to determine the overall coolant condition of the vehicle system

B. Combine fluid samples from all reservoirs into one container to perform a single chemistry analysis at once

C. Top off all reservoirs with the same coolant, since hybrid coolant chemistries are standardized industry-wide

D. Identify each reservoir and use only the OEM-specified coolant for that particular cooling loop on the vehicle

33. Most hybrid HV battery packs require:

A. Quarterly preventive maintenance including individual cell voltage measurement and balancing procedures

B. No routine maintenance during the pack's service life beyond the OEM-specified inspections and software updates

C. Annual specific gravity testing of each module to verify proper cell chemistry across the entire pack assembly

D. Monthly disconnection and recharging using an external charger to maintain cell balance at all times always

34. A hybrid vehicle's drive shafts (axles) electrically:

A. Carry HV current as part of the regenerative braking path between the wheels and the inverter assembly

B. Use orange insulation on the shaft itself to designate that they are part of the HV system on the vehicle

C. Are not part of the HV system and carry only mechanical torque between the transaxle and the wheels

D. Provide a redundant ground path for the HV system in case the primary chassis ground connection fails

35. Most orange HV connectors on hybrid vehicles require the technician to:

A. Release a mechanical lock or lever before pulling the connector apart, in a specific OEM-published sequence

B. Twist the connector counterclockwise while pulling outward to release the internal locking mechanism set

C. Apply heat to the connector with a heat gun before pulling, to soften the rubber sealing material first

D. Cut the locking tab off with side cutters before pulling, since the locks are not designed to be reused

36. A hybrid vehicle's catalytic converter:

A. Is not needed because the engine runs intermittently and produces fewer total emissions per mile driven

B. Is significantly smaller than a conventional vehicle's catalyst because of the reduced engine operating hours

C. Must be replaced more often because the engine's frequent start-stop cycles cause thermal stress and damage

D. Functions similarly to a conventional vehicle's catalyst and may require additional preheating strategies

37. A typical hybrid HV battery loses approximately what percentage of its original capacity per year of normal use?

A. About 30% per year, requiring frequent replacement of the pack throughout the vehicle's service life

B. About 2-3% per year on average, with the rate dependent on use patterns, temperature, and chemistry

C. About 75% per year, making hybrids economically impractical to own beyond the original warranty period

D. About 0% per year, since HV battery packs are designed to maintain full capacity for their entire service life

38. During regenerative braking on a hybrid vehicle, power flows from:

A. The HV battery through the inverter to the drive motor, which provides additional braking torque to the wheels

B. The engine through the planetary gear set to the drive motor, then out to the HV battery for storage as charge

C. The drive motor (acting as generator) through the inverter back to the HV battery as stored electrical energy

D. The 12-volt auxiliary battery through the DC-DC converter to the HV battery as direct charging current

39. A "passive" hybrid battery cooling system relies on:

A. A dedicated liquid coolant loop with an electric pump that circulates fluid through cold plates between cells

B. A refrigerant-based chiller that shares the vehicle's main A/C compressor for low-temperature heat removal

C. A pyrotechnic battery cooler that activates only during extreme overheating events to prevent thermal runaway

D. Natural convection or fans drawing ambient air across the cells without refrigerant or coolant circulation

40. A plug-in hybrid's charging port often has indicator lights that show:

A. Charging status (charging, complete, fault) so the customer can confirm operation without entering the vehicle

B. The vehicle identification number flashed in Morse code for security identification during charging session

C. The vehicle's GPS location coordinates so the EVSE can verify the vehicle is at an approved location for use

D. The current price of electricity from the EVSE, displayed in dollars per kilowatt-hour during the charging cycle

41. The electrical safety boundary distance around an energized hybrid HV component is determined by:

A. The distance from the floor where standard insulating mats provide adequate protection underfoot at all times

B. The maximum reach of the technician's arms while wearing OSHA-approved rubber insulating gloves during work

C. NFPA 70E approach boundary tables that consider system voltage and worker qualification level for safe distance

D. A fixed 6-foot perimeter around the vehicle, established by industry consensus for all hybrid work procedures

42. When replacing an HV cable assembly on a hybrid vehicle, the technician must:

A. Use any cable rated for at least 600 volts and the proper current-carrying capacity, regardless of color

B. Use only the OEM-specified replacement part, since the cable's specifications go beyond color and voltage rating

C. Spray-paint a black aftermarket cable orange to match the original HV color code before installation in vehicle

D. Tape over the existing orange cable color with electrical tape to provide visual continuity along the entire path

43. A hybrid vehicle in cold weather may show reduced regenerative braking capacity because the:

A. HV battery temperature is below the optimal range and the BMS limits charge current to protect the cells

B. Brake pedal stroke sensor has a temperature compensation feature that reduces sensor signal in the cold

C. Drive motor permanent magnets become less effective in cold temperatures, reducing back-EMF output

D. Brake rotors expand in cold weather, requiring more friction brake application to compensate for the change

44. A Tesla Model S, while not a hybrid, shares some hybrid technology including:

A. A gasoline engine for use during extended highway driving when the battery state of charge is depleted

B. A series hybrid configuration that uses a small auxiliary engine to charge the battery during long trips

C. A continuously variable transmission (CVT) similar to those used in Toyota power-split hybrid vehicles

D. Three-phase AC drive motors, an inverter, a large HV battery pack, and a 12-volt auxiliary battery system

45. Removing a hybrid HV battery pack typically requires:

A. A single technician working alone, since the pack is light enough for one person to handle easily and safely

B. The customer's assistance during removal to verify the HV system is properly de-energized before lifting begins

C. Two or more trained technicians, due to the pack's weight, size, and the safety steps required for HV work

D. An electrical engineer's direct supervision throughout the removal process due to the regulatory requirements

ANSWER KEY — PRACTICE EXAM 17 (Q1–Q45)

1. D — Pacemakers and similar implanted medical devices can be affected by strong magnetic and electromagnetic fields, so a technician with such an implant must avoid working on energized HV components and consult their physician about workplace exposure limits. Working on de-energized vehicles is generally safe. Workplace policy should be set in writing once the physician's guidance is documented.

2. B — A hot stick (insulated rescue hook) is used to physically separate a person from energized high-voltage conductors without the rescuer becoming part of the circuit. The stick's insulating reach keeps the rescuer outside the dangerous boundary while saving the victim. It is purpose-built rescue equipment, not a diagnostic tool.

3. A — A clamp meter measures current flowing through a conductor by sensing the magnetic field around it, allowing measurement without breaking the circuit. The CAT III 1000V rating means the meter is rated for the energy transients found in hybrid HV circuits. Insulation resistance and bus voltage measurements use different tools and connections.

4. C — A 48-volt mild hybrid system operates below the typical 60-volt DC shock-hazard threshold, so PPE and procedural requirements are less stringent than for high-voltage hybrids. Cables are still well-marked and care is still required, but Class 0 gloves and CAT III 1000V tools are not mandated. Recognizing the voltage class drives the proper procedure choice.

5. D — A belt-starter-generator (BSG) replaces the conventional alternator and starter motor on a mild hybrid, performing both functions plus providing mild electric assist during acceleration. The single belt-driven unit handles start, charge, and assist. This integration is what defines the 48-volt mild hybrid architecture.

6. C — A hybrid with a dead 12-volt auxiliary battery is jump-started at the designated 12-volt jump-start terminals or directly at the 12-volt battery posts; the HV system cannot and must not be jump-started from external power. Once the 12-volt system has voltage, the HV system can be commanded on through its normal startup sequence. Connecting external power to HV terminals is dangerous and unsupported.

7. A — Most hybrid HV battery packs carry a date code (often integrated into the pack serial number) on a label affixed to the pack itself. Comparing the date code to vehicle build date gives an accurate age. Other methods such as cell voltages or temperatures do not reliably indicate pack age.

8. B — The magnetic field around an energized hybrid drive motor and its cables is strong enough to interfere with sensitive electronic devices, magnetic-stripe credit cards, and certain medical implants placed close to the equipment. The field does not magnetize hand tools meaningfully or affect fuel economy. Awareness of this is part of shop safety policy.

9. D — Metallic shielding around HV cables contains the electromagnetic interference radiated by the high-frequency switching currents inside the cable, preventing it from coupling into nearby low-voltage circuits and sensors. The shielding is also part of the fault-current return path used by the isolation monitor. It is not a structural or abrasion protection element.

10. A — Hybrid HV batteries are classified as hazardous materials, so ground transport must comply with DOT 49 CFR regulations for the applicable cell chemistry, including proper packaging, marking, labeling, and shipping papers. Compliance is the shipper's responsibility, not the carrier's. Skipping these steps creates serious legal and safety risk.

11. C — A rubber grommet around an HV cable passing through a sheet metal panel prevents the panel edge from chafing through the cable's insulation jacket over time, protecting the dielectric barrier. Grommets are not conductors or primary insulation. Damaged or missing grommets are a common cause of long-term isolation faults.

12. A — A hybrid EPS torque sensor measures the twisting force the driver applies to the steering wheel via the steering column shaft, and the steering control module uses that signal to command the assist motor accordingly. Pressure, lateral acceleration, and vehicle speed alone do not provide the input the system needs to follow driver intent. Faults in the sensor produce inappropriate assist behavior.

13. B — The pedal travel sensor reports brake pedal position to the brake/regen control module, which calculates driver deceleration demand and blends regenerative braking with friction braking to meet that demand. The signal is not used primarily as an engine throttle override or as an HCM auto-stop input. Sensor faults disrupt the regen blend immediately.

14. D — The steering angle sensor's primary consumer is the ABS/ESC stability system, which compares the driver's commanded steering position with measured yaw rate to detect under- or oversteer. Hybrid power management, inverter control, and DC-DC operation do not rely on steering angle. The sensor is shared across stability-related controllers.

15. C — HV bus voltage is measured at the OEM-designated HV test points or terminals at the inverter, using a CAT III 1000V or better meter. Measuring at the 12-volt battery, the motor terminals on the transaxle case, or by piercing cable insulation is unsafe or invalid. Using designated test points protects both the technician and the equipment.

16. B — A reading of 50 megohms between motor windings and case is well above the typical OEM minimum acceptable insulation resistance (often 1–10 megohms for a healthy motor), so the insulation is in good condition. Higher readings indicate better isolation. The motor does not need replacement at this value.

17. A — Hybrid HV batteries fall under the EPA Universal Waste Rules and the broader Resource Conservation and Recovery Act (RCRA) framework for hazardous waste in the United States. DOT covers transport, but disposal is governed by EPA. Compliance with both is required for end-of-life pack handling.

18. C — EPA refrigerant handling rules apply to hybrid A/C systems the same as to conventional vehicles, requiring EPA Section 609 certification for any technician recovering, recycling, or recharging refrigerant. The fact that the compressor is electric does not change the federal refrigerant rules. The shop must have certified personnel and approved equipment.

19. A — The DC-to-DC converter steps the HV bus voltage down to approximately 14 volts to charge the 12-volt auxiliary battery and run the conventional 12-volt accessories. It replaces the conventional alternator. Without a functional DC-DC, the 12-volt battery quickly discharges and the vehicle becomes inoperative.

20. D — Plug-in hybrid charging ports are typically located on the side of the vehicle behind a hinged flap, giving the customer convenient external access for the charging cable. Engine compartment, trunk, and underbody locations are not used because they are not practical for daily plug-in use. The exact side and quarter vary by manufacturer.

21. B — A hybrid vehicle's malfunction indicator lamp functions the same as on a conventional vehicle for OBD-II emissions concerns, but most hybrids also include a separate "Check Hybrid System" warning that illuminates for hybrid-specific faults. Both lamps must be observed when diagnosing. A single MIL does not capture the full status of the hybrid system.

22. C — P0AA6 specifically indicates an HV system isolation fault — the isolation monitor has detected a leakage path between an HV conductor and chassis ground that exceeds the allowable threshold. The code does not imply pack end-of-life, 12-volt failure, or an inverter overcurrent. Following the OEM diagnostic for P0AA6 isolates the leakage source.

23. D — A hybrid HV battery test station is a shop-level tool used to cycle and analyze a removed pack, evaluating individual cell condition, total pack capacity, internal resistance, and overall pack health. It is not used to charge an installed pack via J1772 or to simulate driving. The output guides repair, refurbish, or replace decisions.

24. A — After replacing an HV cable, the technician performs an isolation resistance test on the new cable and a complete HV system scan to verify the repair and confirm no codes remain. Visual inspection alone is not sufficient. Documenting both results protects the technician and the customer.

25. C — A back-EMF test spins the motor externally (with another motor or by hand) and measures the three-phase AC voltage the motor generates as a result; that output, compared to OEM specifications, confirms motor winding health. Applying DC, battery charger current, or measuring static resistance does not produce a back-EMF reading. The test confirms healthy phases by waveform symmetry.

26. B — The air bag (SRS) system on a hybrid operates on the 12-volt system independently of the HV system, but the airbag controller's crash signal is used by the hybrid controller to immediately open the main contactors and isolate the HV battery. This crash-triggered shutdown is part of the vehicle's collision safety strategy. SRS uses its own dedicated low-voltage wiring color code, typically yellow.

27. D — Main HV contactors are open by default and only close when the hybrid control module commands them closed during the startup sequence, after pre-charge and HVIL checks pass. They open automatically at shutdown and during faults. This default-open design is fundamental to HV safety.

28. A — Hybrid creep is created by the drive motor (MG2) supplying a small amount of torque to the wheels with the brake released, mimicking the feel of a conventional torque converter. The torque comes

from the HV system, not from the 12-volt system or a mechanical clutch. Customers expect this behavior and removing it would feel unusual.

29. B — After a coolant change on the power electronics loop, the technician must follow the OEM-specified vacuum-fill or scan-tool-commanded purge procedure to remove all air pockets. Air left in the loop creates hot spots, sets temperature codes, and shortens IGBT life. Driving the vehicle to "self-bleed" is not adequate.

30. B — Moisture in an HV battery pack or inverter creates conductive leakage paths that reduce isolation resistance between HV conductors and chassis ground, increasing shock hazard and triggering isolation fault codes. Moisture does not freeze cable insulation or evaporate harmlessly within minutes. Pack drying and integrity testing are required after any moisture exposure.

31. A — On a typical Toyota Prius, the inverter is mounted under the hood in a metal box prominently labeled with orange high-voltage warning markings. Placing it under the hood keeps it close to the dedicated power-electronics cooling system. Recognizing this location is part of basic Prius service knowledge.

32. D — A hybrid vehicle has several distinct cooling loops, each with its own reservoir and specified coolant. The technician must identify each reservoir and use only the OEM-specified coolant for that loop. Cross-filling can cause isolation faults in the power-electronics loop or corrosion in the engine loop.

33. B — Most hybrid HV battery packs require no routine maintenance during the pack's service life beyond OEM-specified inspections (visual, terminal torque check) and any published software updates. The BMS handles cell balancing internally. Owners and shops should not attempt added maintenance like external balancing or recharging on a sealed pack.

34. C — Hybrid drive shafts (axles) are mechanical components only; they carry torque between the transaxle and the wheels and are not part of the high-voltage electrical system. Three-phase AC current to the motor stays inside the transaxle, between the inverter and the motor's stator. Confusing the mechanical and electrical paths is a common misconception.

35. A — Orange HV connectors include a mechanical lock or lever that the technician must release in the OEM-published sequence before pulling the connector apart. The lock prevents accidental disconnection and is engineered for repeated cycles when handled correctly. Forcing or cutting the lock damages the connector and creates an unsafe connection.

36. D — A hybrid vehicle's catalytic converter functions similarly to a conventional vehicle's, but because the engine cycles between off and on more frequently, the system may use additional preheating or post-start enrichment strategies to keep the catalyst at light-off temperature. The catalyst is essential, not optional, and is typically full-size. Recognizing the warm-up strategy explains some normal hybrid engine behavior.

37. B — A hybrid HV battery loses on average about 2–3% of its original capacity per year of normal use, with the actual rate driven by temperature, charge/discharge patterns, and chemistry. After ten years, packs

typically retain a usable majority of their original capacity. Drastic year-over-year losses indicate a fault, not normal aging.

38. C — During regenerative braking, the drive motor acts as a generator producing three-phase AC, which the inverter rectifies into DC and routes back to the HV battery for storage. This recovers kinetic energy that would otherwise be lost as friction heat. Power flow direction is the opposite of acceleration mode.

39. D — A passive battery cooling system relies on natural convection or simple fans drawing ambient cabin or outside air across the cells, without refrigerant or coolant circulation. Active systems use liquid coolant or refrigerant chillers. Passive cooling is simpler and cheaper but less effective in high-temperature conditions.

40. A — Plug-in hybrid charging ports typically include indicator lights that display charging status — actively charging, complete, or fault — so the customer can confirm operation from outside the vehicle. The lights do not display VIN, GPS coordinates, or pricing. Recognizing these indicators is part of customer education on plug-in operation.

41. C — The electrical safety boundary around energized HV equipment is set by NFPA 70E approach boundary tables, which consider system voltage and worker qualification level to define limited and restricted approach distances. Arm reach, mat distance, and arbitrary perimeters are not how the boundary is defined. Using the NFPA tables provides a defensible, code-compliant boundary.

42. B — An HV cable assembly must be replaced only with the OEM-specified part because the cable's specifications include conductor size, insulation chemistry, shielding configuration, grounding terminations, length, and connector style — far beyond color and voltage rating alone. Generic substitutes that "look" right introduce isolation and EMI risk. The OEM part is engineered as a system.

43. A — Cold ambient temperatures slow lithium-ion chemistry, and the BMS limits charge current to protect the cells from damage during high-rate regen events. Regen capacity is therefore reduced until the pack warms up. The pedal sensor, motor magnets, and brake rotors are not the controlling factor in this scenario.

44. D — A Tesla Model S, although a pure EV rather than a hybrid, shares core electrified components with hybrid vehicles, including three-phase AC drive motors, an inverter, a large HV battery pack, and a 12-volt auxiliary battery system. Technicians trained on hybrid HV safety and architecture work with the same component families on a Tesla. The key difference is the absence of an internal combustion engine.

45. C — Removing a hybrid HV battery pack typically requires two or more trained technicians because of the pack's weight, awkward geometry, and the safety verifications that must run in parallel with mechanical removal. A single technician working alone cannot safely manage both. OEM service procedures often specify the personnel requirement.