PRACTICE EXAM 15: ASE L3 SIMULATION (45 Questions)

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

1. A hybrid vehicle's HV components are typically marked with a specific orange high-voltage warning symbol. The technician should:

A. Remove the symbol after repair so the customer is not alarmed by the warning indicator

B. Ignore the symbol because all HV components in a hybrid are dangerous regardless of any marking

C. Recognize the symbol as identifying HV hazard and ensure all OEM labels remain in place after service

D. Replace the symbol with a generic warning label that meets local jurisdictional requirements for safety

2. Per NFPA 70E, the appropriate PPE category for working on a typical hybrid HV system depends on:

A. The total weight of the vehicle and the size of the technician performing the service work

B. The available incident energy at the work location, which depends on system voltage and fault current

C. The age of the vehicle being serviced and the manufacturer of the HV battery installed in it

D. The ambient temperature of the shop where the service work is being performed at the time

3. A vehicle in which the engine is mechanically coupled to the wheels and can also operate together with the electric motor for added power is classified as a:

A. Series hybrid where the engine has no mechanical path to the drive wheels at any time

B. Mild hybrid where the electric motor provides only brief startup assist with no extended drive contribution

C. Series-parallel hybrid where the engine and motor share output only through an electrical bus arrangement

D. Parallel hybrid where both engine and motor can drive the wheels independently or together

4. A removed hybrid HV battery pack must be stored:

A. In a cool, dry, well-ventilated area away from direct sunlight, ignition sources, and combustible materials

B. In direct sunlight to maintain a steady warm temperature that promotes pack self-balancing during storage

C. In a sealed plastic bag to prevent any air contact that could oxidize the battery terminals during storage

D. Outside the shop in any open-air location to provide unrestricted ventilation in case of off-gassing events

5. The bus bars connecting cells inside a hybrid HV battery pack are typically made of:

A. Aluminum because of its light weight and low cost compared to other conductive metal materials

B. Steel because of its high mechanical strength and resistance to vibration damage during operation

C. Copper or nickel-plated copper because of its high electrical conductivity and low resistive heating

D. Plated brass because of its corrosion resistance and ease of stamping into a flat conductor shape

6. A shorted DC link bus capacitor inside a hybrid inverter will most likely cause:

A. A gradual loss of cabin heating during EV-only operation in cold ambient temperature conditions

B. A high-pitched whine from the inverter during normal vehicle acceleration that fades at cruise

C. The vehicle to operate normally but with reduced fuel economy over thousands of miles of driving

D. The HV system to set an immediate inverter fault code and prevent the vehicle from entering ready mode

7. The refrigerant oil used in a hybrid vehicle's electric A/C compressor must be:

A. The same PAG oil used in conventional belt-driven compressors found in non-hybrid vehicles

B. POE (polyolester) oil that is non-conductive and rated for use with HV electric compressor windings

C. Mineral oil that has been used in automotive A/C systems for many decades without modification

D. Synthetic ester oil that is designed for refrigeration compressors in commercial industrial systems

8. A typical hybrid HV battery pack can weigh from 100 to 800 pounds or more. When removing such a pack, the technician should:

A. Use an OEM-approved lift table or hoist rated for the pack's weight with the proper attachment fixtures

B. Use the shop's standard floor jack with wooden blocks to support the pack as it is lowered to the floor

C. Have two technicians lift the pack by hand using leather work gloves and lifting belts for back support

D. Allow the pack to fall onto a stack of cardboard boxes placed below the vehicle for impact cushioning

9. A heat pump cabin heater on a hybrid or plug-in hybrid vehicle:

A. Generates heat through electrical resistance elements connected directly to the high-voltage battery bus

B. Uses engine coolant heat exclusively even when the engine is off during EV-only mode operation

C. Burns a small amount of fuel from the main tank during cold weather to warm the cabin compartment

D. Extracts heat from ambient air using a refrigerant cycle, similar in principle to a residential heat pump

10. Hybrid vehicle tires are often specified for:

A. Lower inflation pressures than conventional vehicles to improve ride comfort during city driving conditions

B. Higher operating temperatures because hybrid vehicles generate more heat at the tire contact patch overall

C. Lower rolling resistance to maximize fuel economy benefits provided by the hybrid drivetrain system

D. Reduced traction characteristics because regenerative braking eliminates the need for high friction surfaces

11. A hybrid vehicle exhibits a complaint that matches a current Technical Service Bulletin (TSB) issued by the manufacturer. The technician should:

A. Follow the TSB diagnostic and repair procedure exactly as published before performing other diagnostic steps

B. Disregard the TSB because TSBs are advisory and not required to be followed during repair procedures

C. Charge the customer extra labor time for reviewing the TSB before starting the repair procedures

D. Replace the most likely failed component first and only consult the TSB if the initial repair is unsuccessful

12. The GM Voltec system used in the original Chevrolet Volt operates as:

A. A pure series hybrid in all driving conditions including highway and city operation at any speed

B. A series-parallel hybrid that can switch to combined engine-motor operation at higher speeds for efficiency

C. A pure parallel hybrid in which the engine is always connected mechanically to the drive wheels

D. A mild hybrid with no capability to drive on electric power alone for any meaningful distance

13. A hybrid HV fuse rated for several hundred amps and high voltage is most commonly identified as a:

A. Standard mini blade fuse identical to the type used in the vehicle's 12-volt fuse box and panels

B. Pyrotechnic or high-current automotive fuse designed for high-voltage DC interrupt capability rating

C. Glass tube cartridge fuse similar to those used in legacy automotive lighting and accessory circuits

D. Resettable circuit breaker that automatically restores power once the overload condition has cleared

14. A hybrid vehicle's transaxle fluid containing MG1 and MG2 should be changed:

A. Only when the fluid becomes visibly discolored or contaminated during a brake service inspection

B. Every 3,000 miles to match conventional engine oil change intervals for synthetic blend formulations

C. Never; the fluid is sealed and intended to last the entire life of the transaxle assembly without service

D. At the OEM-specified interval, since electric current and aging degrade its dielectric properties over time

15. The Hyundai TMED (Transmission-Mounted Electric Device) hybrid architecture uses:

A. A single motor mounted between the engine and a conventional automatic transmission with an engaging clutch

B. Two motor-generators mounted inside a planetary gear set similar to the Toyota power-split design

C. A series hybrid architecture with no mechanical connection between the engine and drive wheels at all

D. A wheel hub motor at each corner driven directly by a central battery-inverter assembly module

16. When recovering refrigerant from a hybrid vehicle's electric A/C system, the technician should:

A. Use a standard refrigerant recovery machine without any special precautions or service procedures

B. Recover the refrigerant only after disconnecting the high-voltage service plug from the HV battery

C. Use a recovery machine certified for use with electric A/C systems to avoid PAG-POE cross-contamination

D. Vent the refrigerant to the atmosphere because hybrid refrigerant volumes are too small to recover

17. Some plug-in hybrids include an electric coolant heater that:

A. Heats the engine coolant using the 12-volt battery during cold weather startup operations only

B. Heats coolant using high-voltage current for cabin heat during EV-only operation when the engine is off

C. Heats the HV battery pack coolant continuously during all driving conditions including warm weather

D. Heats the transaxle fluid before operation to reduce parasitic drag in cold ambient conditions outdoors

18. After completing HV service work on a hybrid vehicle, the technician should:

A. Reset the maintenance reminder light to clear any service notifications stored in the instrument cluster

B. Notify the customer verbally that the HV system has been serviced without any written documentation

C. Disconnect the 12-volt battery briefly to ensure that all module memory is cleared before customer pickup

D. Document the work performed, including all safety verifications and test results, in the vehicle service record

19. A pre-charge contactor that fails to close before the main contactor closes will most likely cause:

A. Welded main contactor contacts due to inrush current as the bus capacitors charge rapidly through them

B. A no-start condition because the inverter bus capacitors never receive the initial precharge voltage

C. A low-current charge cycle that takes hours to complete instead of seconds during normal startup

D. A fault code for the 12-volt auxiliary battery because the precharge circuit is powered from it

20. Insulated tools used for hybrid HV work should be stored:

A. Loose in a standard tool drawer alongside non-insulated tools to keep them organized in the workshop area

B. In direct sunlight to allow UV radiation to sterilize the insulating coating between service work sessions

C. In a dedicated location protected from physical damage, contamination, and temperature extremes

D. Inside a sealed metal container with desiccant packets to prevent any moisture buildup over time

21. A hybrid HV battery pack's significant mass affects the vehicle's:

A. Aerodynamic drag coefficient by changing the airflow under the vehicle body during high-speed operation

B. Center of gravity and handling characteristics, often resulting in a lower CG than a comparable non-hybrid

C. Tire wear pattern by causing uneven wear across the tread surface during normal cornering maneuvers

D. Fuel tank capacity by displacing fuel volume from the rear of the vehicle in the trunk compartment area

22. A hybrid or EV that supports bidirectional charging (V2L, V2H, or V2G) can:

A. Discharge energy from its HV battery to power external loads, a home, or feed back to the electrical grid

B. Charge faster than a conventional EV by using two charging connectors simultaneously to double the rate

C. Convert AC current to DC current internally and store it in a separate battery from the main HV pack

D. Switch between three-phase AC charging and single-phase AC charging based on the EVSE that is connected

23. Shipping a damaged hybrid HV battery pack requires:

A. No special handling because automotive batteries are exempt from hazardous materials shipping rules

B. Standard ground freight in any common carrier container intended for general automotive parts shipping

C. Air transport only, because damaged batteries cannot be safely shipped by ground transportation methods

D. Specific DOT hazardous materials documentation, packaging, and labeling per applicable shipping regulations

24. State of charge (SOC) on a hybrid HV battery is defined as:

A. The total remaining capacity of the battery pack compared to its original capacity when manufactured

B. The current amount of energy stored in the pack, expressed as a percentage of its available usable capacity

C. The maximum power the pack can deliver, expressed as a percentage of its peak design output rating

D. The internal resistance of the pack, expressed as a ratio of the original new-battery internal resistance value

25. A hybrid drive motor produces its maximum torque output at:

A. The highest possible motor RPM where back-EMF is maximized for power delivery to the drive wheels

B. The point where the motor temperature exceeds its rated operating range and thermal limit conditions

C. Zero or low RPM, providing strong off-the-line acceleration that complements internal combustion engines

D. Highway speeds where the inverter switching frequency matches the drive motor's natural resonance

26. Some hybrid vehicles emit an audible artificial sound when operating in EV-only mode at low speeds because:

A. Pedestrian safety regulations require minimum sound emission for hybrids operating quietly at low speeds

B. The sound indicates that the inverter is functioning properly during normal vehicle operation conditions

C. Hybrid manufacturers use the sound to indicate the type of operation the vehicle is performing at the moment

D. The artificial sound mimics the engine sound to maintain a familiar driving experience for the customer

27. The cold plate used to cool a hybrid inverter typically:

A. Contains liquid refrigerant that flashes to gas to absorb heat from the IGBTs and other components

B. Uses a thermoelectric Peltier effect device that pumps heat from the components to ambient air

C. Channels low-conductivity coolant through internal passages directly under the IGBT mounting locations

D. Relies on radiation alone to dissipate the heat generated by the inverter's high-current switching activity

28. A hybrid vehicle has set an unusual fault code that the technician has not encountered before. The proper procedure is to:

A. Replace the most likely failed component based on the technician's previous experience with hybrid vehicles

B. Clear the code and release the vehicle to the customer to see if the code returns within a few days

C. Consult OEM service information for the specific code's meaning and the published diagnostic procedure

D. Disconnect the 12-volt battery to perform a system reset before continuing with any further diagnostic steps

29. DC fast charging stations commonly deliver power at:

A. 1.4 kW from a standard 120-volt grounded receptacle for slow overnight residential charging only

B. 50 kW or higher, with newer stations providing 150 kW, 350 kW, or more for rapid vehicle charging

C. 6.6 kW from a 240-volt circuit similar to those used for household dryers and electric ranges only

D. 480 volts AC at low amperage for short-duration top-off charging at convenience commercial outlets

30. A hybrid vehicle's engine may run continuously during cold weather startup because the:

A. 12-volt auxiliary battery requires the engine to charge it before the HV system can be safely energized

B. HV battery pack must heat up to ambient temperature before electrical assist can begin operation

C. Vehicle requires emissions compliance testing during the first 30 seconds of every operation cycle

D. Engine and catalytic converter must reach operating temperature for emissions control and cabin heat

31. A visual inspection of an orange HV cable should verify that:

A. The insulation is intact with no cuts, abrasions, melted spots, or discoloration along its entire length

B. The shielding has been removed entirely to allow ventilation around the conductors during normal operation

C. The cable is routed in physical contact with other harnesses to allow for natural electromagnetic coupling

D. The connector ends have been opened to allow visual inspection of the individual conductor wire strands

32. IGBT modules in a hybrid inverter dissipate heat through:

A. The motor's three-phase output cables, which carry heat away to the transaxle housing during operation

B. The 12-volt battery cable, which transfers excess heat to the auxiliary battery during all driving conditions

C. The HV pack's main contactor, which acts as a thermal bridge between the inverter and battery enclosure

D. A thermally conductive baseplate that transfers heat into the inverter's dedicated coolant loop assembly

33. When replacing a hybrid HV battery cell module, the technician should:

A. Use any compatible module from a salvage vehicle to save on replacement parts cost for the customer

B. Use a generic aftermarket cell module that fits the pack physically without OEM matching specifications

C. Use the OEM-specified module, ideally matched in age, capacity, and state of health to the existing modules

D. Use the highest-capacity cell module available to extend the pack's overall capacity beyond original specs

34. The accelerator pedal on most hybrid vehicles is:

A. A direct mechanical cable to the throttle body, identical to conventional vehicles built before the 2000s

B. An electronic pedal position sensor that the hybrid control module interprets to command motor and engine torque

C. A hydraulic pressure source that controls engine throttle and motor output through fluid pressure changes

D. A pneumatic vacuum sensor that detects driver intent through vacuum changes in a sealed pedal chamber

35. A hybrid vehicle often has multiple separate cooling loops, including:

A. An engine coolant loop, a power electronics coolant loop, and sometimes a separate HV battery coolant loop

B. A single shared cooling loop that serves the engine, inverter, motor, and battery without any separation

C. An engine oil cooler loop and an HV battery loop only, with the inverter being cooled by ambient air alone

D. A refrigerant-only system that uses A/C refrigerant to cool all hybrid components simultaneously together

36. Before performing any non-HV service work on a hybrid vehicle (such as a brake job or oil change), the technician should:

A. Always remove the HV service plug to ensure absolute safety during any non-HV repair procedure

B. Always disconnect the 12-volt battery to ensure the HV system cannot be commanded on by mistake

C. Always discharge the inverter bus capacitors before any work because they may retain dangerous voltage

D. Verify the vehicle is in OFF mode (not Ready) with the key removed before working on conventional systems

37. A customer reports a high-frequency whine from under the hood of a hybrid vehicle that varies with vehicle speed but disappears when the vehicle is stopped in ready mode. The most likely source is:

A. The 12-volt auxiliary battery making contact noise as it discharges during normal driving conditions

B. The cabin air filter creating turbulence as outside air enters the climate control system during driving

C. The inverter or motor producing audible PWM switching noise, which is a normal hybrid characteristic

D. The exhaust system resonating against the body structure during the engine's normal idle vibrations

38. When supporting a hybrid HV battery pack for removal from the vehicle, the lifting fixture must:

A. Engage only at the OEM-specified lift points designed to support the pack's weight and balance

B. Contact the pack at any convenient location that allows for easy access to the mounting bolts

C. Apply pressure directly on the orange HV cable terminals to ensure stable lifting during removal

D. Lift the pack from the bottom of the cell modules to keep the case from flexing during the lift

39. A customer is concerned that the engine on their new hybrid vehicle starts and stops at traffic lights. The technician should:

A. Recommend a service to disable the auto-stop function permanently for an additional labor charge

B. Explain that engine auto-stop is a normal hybrid feature designed to save fuel and reduce emissions

C. Diagnose the issue immediately because the engine should never auto-stop on any vehicle for safety

D. Schedule a recall service appointment because auto-stop indicates a serious vehicle defect requirement

40. A plug-in hybrid (PHEV) with a depleted HV battery operating in "charge sustain" mode:

A. Cannot move under its own power until the HV battery has been recharged from an external AC source

B. Operates exclusively on the internal combustion engine without any electric motor assist contribution

C. Switches to a low-power "limp home" mode that limits the vehicle to a maximum speed of 25 mph

D. Operates similar to a conventional non-plug-in hybrid, using the engine to maintain a low SOC for electric assist

41. A hybrid vehicle has set codes related to the HV system. The most effective diagnostic approach is to:

A. Replace the highest-cost component first to eliminate the most likely fault from the suspect list

B. Disconnect components one at a time until the codes stop setting to isolate the failed component physically

C. Follow the OEM diagnostic flowchart specific to the code, working through each step in the specified order

D. Clear all codes immediately and release the vehicle to the customer for further observation over time

42. Most hybrid HV connectors include a mechanical locking feature that:

A. Prevents accidental disconnection during normal vehicle operation and requires deliberate manual release

B. Automatically discharges any stored voltage in the connector before the technician can remove it from the system

C. Energizes the HV bus only after the connector is fully seated and the lock has been engaged completely

D. Provides a current path to chassis ground in case the connector becomes loose during normal operation

43. Performing work on a hybrid HV system requires that the technician have:

A. A general automotive service certification that covers any vehicle make or model regardless of type or year

B. Specific hybrid/EV training and certification appropriate to the vehicle and the work being performed

C. Only on-the-job experience without any formal training because hybrids are similar to conventional vehicles

D. A valid driver's license and basic shop safety orientation, the same as any entry-level technician training

44. A hybrid inverter contains an integrated coolant temperature sensor that:

A. Measures the temperature of the engine coolant returning from the heater core during cabin heating mode

B. Reports the ambient temperature of the engine compartment to the climate control module for cabin operation

C. Measures the high-voltage battery pack cell temperature to inform the BMS for charge limit decisions

D. Reports inverter coolant loop temperature so the hybrid control module can manage cooling and protect IGBTs

45. Most hybrid HV battery terminal hardware uses specific torque specifications because:

A. Under-torque causes high-resistance heating and over-torque can damage threads or cell terminal connections

B. Hybrid HV terminals are made of soft aluminum that requires very gentle handling during installation work

C. The vibration of normal vehicle operation requires terminals to be loose enough to flex without breaking

D. Loose terminals are required by SAE specifications to allow for thermal expansion of the cable conductor

ANSWER KEY – PRACTICE EXAM 15 (Q1–Q45)

1. C — Orange HV warning symbols mark dangerous voltage and must remain in place after service so future technicians, first responders, and recyclers can identify the hazard. Removing or replacing OEM labels with non-equivalent markings violates manufacturer service procedures and creates a safety hazard. Recognition of the symbol is part of basic HV competency.

2. B — NFPA 70E ties PPE category to incident energy at the work location, which depends on system voltage, available fault current, and clearing time of the protective device. Vehicle weight, age, ambient temperature, and battery manufacturer do not determine the energy a worker could be exposed to. An incident-energy assessment drives proper PPE selection.

3. D — A parallel hybrid has both the engine and the electric motor mechanically coupled to the drive wheels, allowing them to drive the wheels independently or together. This is distinct from series (electric only at the wheels), mild (assist only), and series-parallel (combination architecture). Identifying architecture correctly drives the diagnostic and service strategy.

4. A — A removed HV battery pack must be stored in a cool, dry, well-ventilated area away from sunlight, ignition sources, and combustible materials to manage thermal exposure and reduce the consequences of any cell event. Sealed bags trap off-gassing; outdoor storage offers no fire protection. OEM storage instructions reflect these requirements.

5. C — HV bus bars are made of copper or nickel-plated copper because copper has the high electrical conductivity needed to carry battery currents with minimal resistive heating. Aluminum, steel, and brass do not match copper's conductivity for this duty. The nickel plating prevents corrosion at the cell terminal interface.

6. D — A shorted DC link bus capacitor presents a near-direct short across the HV bus, so the inverter immediately sees an overcurrent or overvoltage fault, sets a hard inverter code, and prevents the vehicle from entering ready mode. The condition is not subtle and does not allow normal operation. Diagnosis requires de-energizing the system before testing.

7. B — Electric A/C compressors require POE (polyolester) oil because it is non-conductive and rated for use with the HV electric motor windings inside the compressor. PAG oil, mineral oil, and synthetic ester oils designed for other applications are conductive or chemically incompatible. Using the wrong oil is one of the most common ways to ruin a hybrid A/C compressor.

8. A — Hybrid HV battery packs can weigh hundreds of pounds and must be supported by an OEM-approved lift table or hoist rated for the pack's weight, with the proper attachment fixtures engaged at

designated lift points. Floor jacks, hand lifting, and cardboard cushioning are unsafe and risk pack damage or technician injury. Proper rigging is part of every published pack removal procedure.

9. D — A heat pump cabin heater extracts heat from ambient air using a refrigerant cycle, operating in principle like a residential heat pump and delivering much higher heating efficiency than resistive heaters. This is particularly useful on EVs and PHEVs that cannot rely on engine waste heat. The technology is increasingly common on newer vehicles.

10. C — Hybrid tires are typically specified as low-rolling-resistance tires so the fuel-economy advantage of the hybrid drivetrain is not lost to tire drag. The trade-offs may include slightly reduced wet traction or shorter tread life. Replacing them with non-LRR tires can measurably reduce fuel economy.

11. A — A current TSB describing the customer's complaint provides the manufacturer's published diagnostic and repair procedure and should be followed exactly before performing other diagnostics. TSBs reflect engineering analysis of repeated failure patterns and reduce diagnostic time. Ignoring a TSB risks misdiagnosis and warranty rejection.

12. B — The original Chevrolet Volt's Voltec system is a series-parallel design that operates primarily in series at lower speeds but uses clutches to add a mechanical engine-to-wheel path at higher speeds for improved efficiency. Calling it a pure series hybrid is a simplification. Correct architecture identification matters when diagnosing power-flow concerns.

13. B — High-current HV fuses on hybrids are pyrotechnic or specialized high-current automotive fuses designed for high-voltage DC interrupt capability — far beyond what a blade fuse or glass cartridge fuse can safely interrupt. Resettable breakers are not used on the main HV path. Correct identification matters when sourcing replacements.

14. D — Hybrid transaxle fluid containing MG1 and MG2 must be changed at the OEM-specified interval because passing electric current and aging gradually degrade its dielectric properties, increasing leakage risk. Leaving it indefinitely or matching engine oil intervals will not match the actual condition of the fluid. Documenting the change protects warranty.

15. A — The Hyundai TMED architecture places a single motor between the engine and a conventional automatic transmission, with a clutch that connects or disconnects the engine. This enables EV-only operation by disengaging the engine clutch. Recognizing the architecture is essential to diagnosing engagement and shift concerns.

16. C — A recovery machine certified for use with electric A/C systems is required to avoid cross-contamination between PAG oil from conventional systems and the POE oil used in HV compressors. Even small amounts of PAG can damage the compressor. Most refrigerant recovery shops use a dedicated machine for hybrid/EV work.

17. B — Electric coolant heaters on plug-in hybrids heat the heater core coolant using high-voltage current, providing cabin heat during EV-only operation when no engine waste heat is available. The element draws significant current from the HV bus during cold weather. Failure of this heater leaves the cabin cold during EV operation.

18. D — All HV service work must be documented, including the safety verifications performed (zero-voltage checks, isolation tests, torque values) and post-repair test results. Documentation protects the technician, the shop, and the customer, and may be required by OEM warranty terms. A service ticket without these entries is incomplete.

19. A — If the pre-charge contactor fails to close before the main contactor closes, the bus capacitors charge through the main contactor's contacts in a single inrush surge that arcs and welds the contact surfaces. The pre-charge resistor exists specifically to limit this current. A welded main contactor leaves HV present at the inverter even when commanded off.

20. C — Insulated tools must be stored in a dedicated, protected location away from physical damage, contamination, and temperature extremes so the insulating coating remains intact and rated. Drawers shared with non-insulated tools and harsh storage conditions damage the insulation. Damaged insulation makes the tool unsafe for HV work.

21. B — The mass of a hybrid HV battery pack, typically located low in the chassis, lowers the vehicle's center of gravity and improves handling stability compared to a similar non-hybrid layout. The pack does not measurably change aerodynamics, tire wear pattern, or fuel tank capacity in the ways the other options describe. CG and handling changes are designed in by the OEM.

22. A — Bidirectional charging (V2L, V2H, V2G) lets a vehicle discharge energy from its HV battery back out through the charging port to power external loads, a home, or feed back to the grid. This requires a compatible vehicle, charger, and protocol. The capability is increasingly common on newer EVs and some PHEVs.

23. D — A damaged HV battery is classified as hazardous material, and shipping requires DOT-compliant documentation, packaging, and labeling per applicable regulations. The chemistry, stranded energy, and potential thermal events all drive these requirements. Improper shipment exposes the shop and carrier to legal and safety risk.

24. B — State of charge (SOC) is the current amount of energy stored in the pack, expressed as a percentage of the available usable capacity at that moment. SOC is distinct from state of health (SOH), which measures aging. SOC and SOH together describe the pack's instantaneous and lifetime status.

25. C — Electric motors produce maximum torque at zero or low RPM, which gives hybrids strong off-the-line acceleration that complements an internal combustion engine — whose torque curve peaks at higher RPM. This characteristic is why hybrids feel particularly responsive from a stop. Understanding the torque curve helps explain customer driveability impressions.

26. A — Pedestrian safety regulations (such as U.S. FMVSS 141 and equivalent international standards) require hybrid and EV vehicles to emit a minimum audible sound at low speeds because their near-silent operation creates a hazard for pedestrians, especially those with visual impairments. The artificial sound is a regulatory feature, not a diagnostic indicator. Disabling it is not permitted.

27. C — Inverter cold plates channel low-conductivity coolant through internal passages located directly under the IGBT mounting positions, removing heat at its source. Refrigerant flash cooling, Peltier devices,

and radiation alone are not used in current automotive designs. Cold plate maintenance is part of inverter cooling service.

28. C — An unfamiliar fault code requires consulting OEM service information to learn the code's specific meaning and to follow the published diagnostic procedure step by step. Parts replacement based on guesswork or clearing-and-releasing risks misdiagnosis and customer dissatisfaction. The OEM procedure exists because the engineering team analyzed the failure mode.

29. B — DC fast charging stations commonly deliver 50 kW or higher, with newer stations supplying 150 kW, 350 kW, or more for rapid vehicle charging. Level 1 (1.4 kW) and Level 2 (6.6 kW or higher) are AC charging at lower power. Selecting the correct charging level matches the vehicle's onboard capability.

30. D — During cold-weather startup, the engine runs continuously to bring the catalytic converter to light-off temperature for emissions control and to provide cabin heat through the heater core. EV-only operation is inhibited until those conditions are met. The behavior is part of normal hybrid operation strategy.

31. A — Visual inspection of an orange HV cable looks for any cuts, abrasions, melted spots, or discoloration along the entire length, because any breach of the insulation system can cause an HV isolation fault or shock hazard. Removing shielding, routing cables in contact with other harnesses, or opening connector ends defeats the cable's protective design. Damaged cables must be replaced as complete assemblies.

32. D — IGBT modules dissipate heat through a thermally conductive baseplate that transfers heat into the inverter's dedicated coolant loop, where it is carried to a heat exchanger and rejected. The output cables, battery cable, and contactors are not thermal paths. Coolant loop health is essential to IGBT life.

33. C — A replacement HV cell module should be the OEM-specified part, ideally matched in age, capacity, and state of health to the existing modules so the BMS sees consistent behavior across the pack. Mismatched modules accelerate imbalance and shorten pack life. Salvage modules without health data and generic aftermarket modules without OEM matching risk repeat failures.

34. B — Most hybrid accelerator pedals are electronic pedal position sensors that send a voltage or digital signal to the hybrid control module, which interprets the input and commands the appropriate engine and motor torque. Mechanical, hydraulic, and pneumatic pedal designs are not used on modern hybrids. This drive-by-wire arrangement is central to hybrid power management.

35. A — Hybrid vehicles commonly have separate cooling loops for the engine, the power electronics (inverter and motor), and sometimes the HV battery, each operating at different temperature ranges. A single shared loop cannot meet all three temperature targets. Identifying which loop is involved is critical when diagnosing thermal complaints.

36. D — Before any non-HV service, the technician verifies the vehicle is in OFF mode (not Ready) with the key or smart key removed from the vehicle area, so the HV system cannot be commanded on by accident. Removing the service plug is not required for non-HV work. The verification step is fast, safe, and required by OEM general service procedures.

37. C — A high-frequency whine that varies with vehicle speed and disappears when stopped in ready mode is most likely audible PWM switching noise from the inverter or motor, which is a normal characteristic of hybrid power electronics. Other listed sources do not match the symptom pattern. Recognizing normal hybrid noises avoids unnecessary repair attempts.

38. A — HV battery pack lifting fixtures must engage only at the OEM-specified lift points, which are designed to support the pack's weight and balance without distorting the case or stressing cell connections. Lifting from arbitrary locations risks dropping the pack, damaging cells, or breaking HV connections. Proper rigging is part of the published removal procedure.

39. B — Engine auto-stop is a normal hybrid feature designed to save fuel and reduce emissions by shutting off the engine at idle and restarting it automatically when needed. The technician's job is to educate the customer that this is intended behavior. Disabling or attempting to "fix" auto-stop is neither needed nor appropriate.

40. D — A PHEV with a depleted HV battery enters charge-sustain mode and behaves like a conventional non-plug-in hybrid, using the engine to maintain a low state of charge so the electric motor can still provide assist. The vehicle continues to drive normally and is not limited to limp-home speeds. Recharging from an external source restores EV-only operation.

41. C — Diagnosing an HV system code requires following the OEM diagnostic flowchart specific to the code, executing each step in the published order so the test results lead to a defensible root cause. Replacing expensive components, randomly disconnecting parts, or clearing codes wastes time and risks misdiagnosis. The flowchart represents the manufacturer's validated diagnostic logic.

42. A — Hybrid HV connectors include mechanical locking features — typically a lever, slide, or latch — that prevent accidental disconnection during normal vehicle operation and require deliberate manual release to disengage. The lock is mechanical, not part of the HV path. Forcing a locked connector damages the connector body.

43. B — Working on a hybrid HV system requires specific hybrid/EV training and certification appropriate to the vehicle and the work being performed, both for safety and for legal/insurance reasons. General certifications and on-the-job experience alone are not sufficient. OEM-specific training is typically required for warranty work.

44. D — The integrated coolant temperature sensor inside a hybrid inverter reports the inverter coolant loop temperature to the hybrid control module, which uses it to manage cooling pump and fan operation and to protect the IGBTs from overheating. Engine coolant, ambient air, and battery cell temperatures are reported by separate sensors. This sensor is critical to inverter longevity.

45. A — Under-torque on HV terminals causes high-resistance heating that can melt connectors or weld terminals, while over-torque damages threads or breaks the cell terminal. Both extremes are unsafe and cause field failures. Following the OEM torque specification with a calibrated torque wrench is the only correct method.