PRACTICE EXAM 20: ASE L3 SIMULATION (45 Questions)

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

1. A hybrid vehicle's high-voltage power distribution unit (sometimes called a high-voltage junction box) typically contains:

A. Main contactors, pre-charge circuit, current sensor, and main HV fuse for the entire HV system

B. The DC-DC converter, the onboard charger, and the cabin heater in a single integrated assembly

C. The drive motor windings, resolver, and gear set in a sealed lubricated housing for protection

D. The 12-volt fuse box, body control module, and all chassis grounding points for the vehicle

2. A technician uses an oscilloscope to look at the DC bus voltage on a hybrid inverter. Excessive ripple voltage observed on the bus most likely indicates:

A. A normal operating condition that requires no further service action by the technician at this time

B. The pre-charge resistor has become open and is no longer functioning as designed during startup

C. A failing DC link capacitor that is no longer smoothing the bus voltage as intended during operation

D. The 12-volt battery is overcharging through the DC-DC converter and feeding noise into the HV system

3. A scope shows that one of the three motor phase currents on a hybrid drive motor is significantly lower than the other two during operation. The most likely cause is:

A. The DC link bus capacitor has shorted to chassis ground, reducing total inverter output across all phases

B. An open or high-resistance connection in one phase, possibly inside the inverter, cable, or motor winding

C. The vehicle is operating in regenerative braking mode where one phase is normally lower than the others

D. The resolver is reading the rotor position correctly and the motor is in its normal operating range condition

4. Wireless charging for plug-in hybrids and EVs uses:

A. Direct electrical contact between a metal floor plate and a metal pad on the bottom of the vehicle frame

B. A laser-based optical energy transfer system that uses focused light to charge the HV battery pack remotely

C. Radio-frequency waves broadcast from a charging tower that the vehicle's antenna captures and rectifies

D. Inductive coupling between a ground-based primary coil and a vehicle-mounted secondary coil during charge

5. A 240-volt single-phase EVSE in a residential installation in North America connects to:

A. A single 120-volt circuit with neutral, with the EVSE doubling the voltage internally for charging output

B. A three-phase 480-volt commercial service that has been step-down transformed to 240 volts for residential use

C. Two 120-volt phase legs of the residential service panel, providing 240 volts between the two legs

D. A dedicated 480-volt circuit in the residential panel installed specifically for high-power vehicle charging needs

6. The Ford eCVT used in the Escape Hybrid and Fusion Hybrid operates as a:

A. Power-split hybrid with two motor-generators in a planetary gear set, similar in principle to the Toyota HSD

B. Mild hybrid with a single belt-driven motor-generator that provides limited assist between the engine and transmission

C. Series hybrid with no mechanical connection between the engine and drive wheels in any operating condition

D. Conventional hybrid with a torque converter and stepped-gear transmission similar to GM's first hybrid designs

7. Hybrid vehicles often feature specialized aerodynamic elements such as:

A. Standard exterior body designs identical to non-hybrid models with no specific aerodynamic optimization

B. Decorative spoilers and ground effects that are intended to enhance the vehicle's sporty appearance only

C. Pop-up wing assemblies that deploy automatically at highway speeds to increase rear downforce significantly

D. Active grille shutters, underbody panels, and low-drag wheel designs to improve overall fuel economy

8. Cylindrical lithium-ion battery cells (such as 18650 or 21700 formats) are characterized by:

A. A flat rectangular shape that packs efficiently into battery modules with minimal wasted internal space

B. A standardized diameter and length naming convention, with the numbers indicating physical dimensions in mm

C. The use of a flexible polymer pouch material that allows the cell to expand and contract during operation

D. A 12-volt nominal voltage output per cell, making them suitable for direct 12-volt automotive applications only

9. HV battery terminal bolts on a typical hybrid pack require specific torque specifications because:

A. Insufficient torque causes high contact resistance and excessive torque can damage the terminal or cell post

B. The bolts must be tight enough to prevent water entry into the battery cell during normal operation

C. The torque value is required only for cosmetic reasons during quality control inspections at the factory

D. The torque ensures the orange paint on the HV terminal matches the manufacturer's color specification correctly

10. The proper procedure for measuring HV bus voltage during a diagnostic test is to:

A. Pierce the orange cable insulation carefully with the meter probe to access the conductor without disconnecting

B. Disconnect the 12-volt battery first to reduce noise on the bus during measurement of voltage and current

C. Use the OEM-designated test points or scan tool data while observing all HV safety procedures during testing

D. Apply the meter probes directly across the main HV battery terminals while the system is in ready mode

11. The temperature sensors used inside a hybrid HV battery module typically are:

A. K-type thermocouples that generate small voltages proportional to the temperature difference between two wires

B. RTDs (resistance temperature detectors) that use platinum wire to measure temperature changes very accurately

C. Mercury-in-glass thermometers that the technician reads visually through a small window in the pack case

D. Thermistors (NTC type) whose resistance changes predictably with temperature for the BMS to interpret

12. An SAE J1772 EVSE cord rated for 32 amps at 240 volts can deliver maximum continuous power of:

A. 1,200 watts per second to the vehicle, which is far below the typical charging speed for a hybrid vehicle pack

B. 3,840 watts continuously, calculated as 16 amps times the 240-volt supply rating from the wall outlet

C. 7,680 watts continuously, calculated as 32 amps times the 240-volt supply voltage to the vehicle inlet

D. 32,000 watts maximum momentary, calculated as 32 amps times the 1,000-volt CAT III meter rating

13. The SAE J1772 Type 1 connector is commonly used in:

A. North America for Level 1 and Level 2 AC charging on most modern plug-in hybrid and electric vehicles

B. Europe exclusively, with no use in North American markets due to incompatible safety standards differences

C. Japan and Korea only, with both regions using incompatible standards from the rest of the world for charging

D. Industrial commercial fleet applications only, with consumer charging using completely different connector types

14. An arc flash event on a hybrid HV system can produce:

A. Only a small spark that creates minimal heat and no shock hazard to the technician or surrounding equipment

B. A high-temperature plasma, intense light, blast pressure, and dangerous shrapnel from vaporized conductors

C. A loud audible warning that gives the technician several seconds to retreat before any actual harm occurs

D. A harmless flash of light similar to a camera flash that may startle but does not cause physical injury

15. Eye protection required for hybrid HV work depends on the task. For routine HV work, the technician should wear:

A. Tinted welding goggles rated for ultraviolet radiation from arc welding operations performed on the vehicle

B. Standard prescription glasses without side shields, since hybrid HV work does not require special eye protection

C. Polarized sunglasses to reduce glare from the orange HV cables that may interfere with cable identification

D. Safety glasses with side shields, with additional arc flash face protection added when working on energized HV components

16. A hybrid vehicle's wheel speed sensors feed signals to the:

A. Inverter directly, so that the inverter can adjust motor speed to match the vehicle's road speed accurately

B. Hybrid control module exclusively, with no involvement in the conventional ABS braking system functions

C. ABS/regen brake controller, which uses the signals for both anti-lock function and regenerative braking control

D. Engine control module only, where they replace the conventional vehicle speed sensor on the transmission output

17. Many hybrid vehicles include a 12-volt battery monitoring system (sometimes called an IBS) that consists of:

A. A current sensor on the 12-volt battery cable that reports battery state to the body or power management module

B. A separate computer module that runs independently of the main hybrid control module without communication

C. A backup battery system that takes over when the main 12-volt battery fails during normal vehicle operation

D. A diagnostic system that monitors only the 12-volt fuse status without measuring any other battery parameters

18. On a hybrid vehicle, the HV system and the 12-volt low-voltage system must be:

A. Physically connected through a hard-wired ground strap at multiple points to ensure equipotential bonding

B. Galvanically isolated from each other so that HV potential cannot reach the chassis through the LV system

C. Wired in series through the inverter so that 12-volt current flows through the same path as the HV current

D. Combined through a shared neutral conductor that is routed through the inverter's main contactor assembly

19. Coolant used in a hybrid vehicle's HV component cooling loop typically contains:

A. Standard nitrate, phosphate, and silicate corrosion inhibitors found in conventional automotive engine coolants

B. Salt-water electrolyte additives that improve conductivity for power transfer between the cooling components

C. Specific corrosion inhibitors compatible with the aluminum and copper components, plus a low-conductivity formulation

D. Brake fluid additives that prevent moisture absorption in the cooling system during extended storage periods

20. Communication with a hybrid vehicle's hybrid control modules through the OBD-II diagnostic port uses:

A. The standard SAE J1850 PWM protocol that has been used on all hybrid vehicles since their introduction

B. A proprietary protocol that is incompatible with any aftermarket scan tool, regardless of cost or features

C. Standard ISO 9141-2 communication only, with no use of the newer CAN bus protocols in any hybrid vehicle

D. CAN bus protocols (ISO 15765) on the OBD-II connector, with enhanced/OEM access required for hybrid-specific modules

21. When a hybrid HV connector is disconnected for service, the first thing the technician should inspect is:

A. The wire harness shielding to ensure it has been preserved during the disconnection procedure for testing

B. The connector pins and seal for damage, corrosion, contamination, and proper alignment before reconnection

C. The vehicle's paint near the connector for any chipping or scratching that may have occurred during access

D. The 12-volt fuse box for any blown fuses that may have resulted from disconnecting the high-voltage connector

22. The Honda i-MMD (intelligent Multi-Mode Drive) hybrid system uses:

A. A single small motor sandwiched between the engine and transmission, similar to the older Honda IMA system

B. Two electric motors and a clutch, with the engine often driving a generator while the motor drives the wheels

C. A series hybrid configuration with the engine permanently disconnected from the drive wheels at all times

D. A continuously variable transmission with a hydraulic torque converter and a single motor-generator inside

23. The serial number of a hybrid HV battery pack is typically:

A. Identical to the vehicle identification number (VIN) of the original vehicle it was installed in originally

B. Generated randomly by the technician during installation and recorded in the customer's repair documentation

C. Permanently affixed to the pack and used to track origin, manufacturing date, and warranty status of the battery

D. Removed after warranty expiration to indicate the pack is no longer covered by the manufacturer's warranty

24. Some recent plug-in hybrids and EVs can serve as a power source to charge another EV or hybrid through:

A. A standard 120-volt AC household outlet integrated into the vehicle's interior cabin compartment area

B. A wireless inductive charging pad mounted on the rear bumper that allows V2V charging during driving

C. The 12-volt accessory power outlet, which provides enough current for emergency vehicle-to-vehicle charging

D. Bidirectional charging capability via a special adapter that connects two charging ports between the two vehicles

25. On a typical full hybrid vehicle, the engine's accessory belt drives:

A. The alternator and starter motor for the conventional 12-volt charging and starting system functions

B. Significantly fewer accessories than a conventional vehicle, often only the water pump or nothing at all

C. The hybrid drive motor through a special pulley arrangement to assist the engine during acceleration events

D. The A/C compressor at engine speed regardless of climate control demand or vehicle operating mode

26. A hybrid vehicle's suspension is often designed to accommodate:

A. The additional weight and altered center of gravity caused by the HV battery pack and electric drive components

B. The lack of weight from removed conventional components that has reduced overall vehicle mass significantly

C. Higher ride height to clear the HV battery pack, which is typically mounted underneath the vehicle's floor pan

D. No special considerations because hybrid vehicles use the same suspension components as their non-hybrid counterparts

27. A hybrid vehicle has set a code for "Inverter Bus Overvoltage" during deceleration. The most likely cause is:

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

B. A failed coolant temperature sensor reading higher than actual coolant temperature on the engine cooling system

C. The HV battery cannot absorb regenerative current quickly enough, often due to high SOC or a contactor issue

D. The vehicle's brake hydraulic pressure has dropped below the minimum value required for normal regen braking

28. On some hybrid vehicles, additional safety colors beyond orange may be used to identify:

A. The vehicle's standard 12-volt accessory wiring harness which is always painted green for chassis ground

B. The exterior body panels of hybrid vehicles to distinguish them from conventional vehicles in the marketplace

C. The interior dash panel switches and gauges to make hybrid features more visible to the driver inside the cabin

D. Specific voltage classes such as blue or yellow stripes added to orange to indicate certain HV subsystems

29. On some hybrid vehicles, the drive shaft includes a specific design feature to:

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

B. Provide electrical isolation between the motor housing and the wheel hub to prevent current flow through bearings

C. Detect drive shaft RPM through an embedded sensor that reports to the inverter for motor synchronization tasks

D. Ground the HV system to the chassis through a low-resistance path for safety during normal operation cycles

30. A hybrid HV work area should be marked with:

A. Cones, barriers, or signs to prevent unqualified personnel from entering the energized HV work zone

B. Yellow caution tape only, since hybrid HV work is no different from other automotive service tasks at all

C. A specific HV barrier color of green to indicate "approved for entry by trained technicians only" at work

D. No marking required, because the orange HV warning labels on the vehicle provide sufficient warning by themselves

31. An HV test probe used to measure HV bus voltage should be:

A. A standard digital multimeter probe extended with a piece of electrical tape for additional reach distance

B. Made of solid brass with no insulation, since brass is a good conductor for accurate voltage readings only

C. Sharpened to a fine point to allow piercing of the orange HV cable insulation for in-circuit voltage measurement

D. CAT III 1000V rated with finger guards and minimum exposed metal tip to limit accidental shorts during testing

32. An Audi A3 e-tron or VW Golf GTE plug-in hybrid uses a:

A. Series hybrid architecture with the engine driving only a generator and not the wheels in any operating mode

B. Pure parallel hybrid with no EV-only mode capability for any extended distance at any vehicle speed

C. Parallel hybrid architecture with a single motor between the engine and a dual-clutch transmission assembly

D. Mild hybrid with a belt-driven starter generator that provides limited assist during heavy acceleration events

33. A hybrid battery test station that simulates vehicle loads is also known as a:

A. Hybrid battery cycler, which can charge, discharge, and analyze the pack at various current rates for diagnosis

B. Standard automotive battery load tester, which is identical to the type used for conventional 12-volt batteries

C. Conventional alternator test bench, repurposed to handle the higher voltages found in hybrid HV battery packs

D. Carbon pile load tester scaled up for HV use, similar to those used in conventional 12-volt automotive service

34. Inside a hybrid HV battery pack, the small-gauge wires running from each cell module to the BMS carry:

A. Low-voltage sensing signals for individual cell voltage and temperature monitoring without high current load

B. The full pack current flowing to and from the inverter through small bus bars to each cell module connection

C. Three-phase AC current from the inverter to each cell module to support cell balancing during operation

D. Refrigerant lines from the A/C system that cool each cell module individually during vehicle operation periods

35. A "high-pot" test on a hybrid HV component refers to:

A. A heating endurance test where the component is exposed to high temperatures for a specified time period

B. A vibration test simulating road conditions performed on a shaker table inside the OEM testing facility area

C. A high-potential dielectric withstand test that applies a high voltage to verify insulation integrity over time

D. A pressure test of the cooling system performed at higher than normal coolant pressure to detect leaks

36. A hybrid HV battery pack removed for warranty service should be stored at temperatures:

A. Below freezing to slow internal chemical reactions and preserve the battery's state of health during storage

B. At the maximum operating temperature of the battery to maintain readiness for immediate vehicle reinstallation

C. At the exact same temperature as the vehicle's normal operating environment to avoid acclimation issues

D. Within the manufacturer's recommended range, typically moderate ambient temperatures, away from extremes

37. A hybrid inverter bus voltage observed on a scope during normal operation should appear as:

A. A relatively steady DC voltage with small ripple at the inverter switching frequency superimposed on top

B. A pure sine wave at the line frequency similar to household AC voltage observed at a standard wall outlet

C. A square wave alternating between zero and maximum voltage at the IGBT switching frequency rate output

D. A triangular sawtooth pattern with peaks corresponding to the resolver's rotational position signal output

38. A pre-charge resistor that has burned open will most likely cause:

A. The HV system to operate normally with no symptoms because the resistor is not required for normal operation

B. Excessive current draw from the 12-volt battery during normal vehicle operation in all driving conditions

C. A no-start condition because the bus capacitors cannot pre-charge before the main contactor is commanded closed

D. The vehicle to operate normally for several weeks before any noticeable symptoms appear during operation

39. The maintenance schedule for a typical hybrid vehicle includes:

A. Annual replacement of the HV battery pack to ensure full capacity is available for the next operating period

B. OEM-specified intervals for inverter coolant, transaxle fluid, brake fluid, and other lubricants and fluids

C. Monthly disconnection and recharging of the HV battery pack with an external charger and meter setup

D. Quarterly replacement of all HV cable connectors to prevent gradual aging of the rubber seals over time

40. The body control module (BCM) on a hybrid vehicle communicates with the hybrid control module through:

A. A dedicated direct hardwire connection that is unique to hybrid vehicles only and not used in any other vehicles

B. The OBD-II diagnostic port, which all modules use exclusively for both communication and diagnostic functions

C. A wireless Bluetooth link inside the vehicle that allows modules to communicate without any wired connections

D. The vehicle's CAN bus network, where hybrid-related events can affect body functions and vice versa

41. HV connectors on a hybrid vehicle are designed to require specific mating forces because:

A. The connectors must remain loose during vehicle operation to allow for thermal expansion of the conductors

B. High mating force ensures the connector pins make poor contact, increasing resistance to limit current flow

C. Specified mating force ensures full pin contact and connector seal engagement for safe HV connection integrity

D. The mating force is set arbitrarily by the manufacturer and has no significant impact on the connector's function

42. On many hybrid vehicles, the 12-volt auxiliary battery is located:

A. Inside the HV battery pack as a single combined assembly to reduce the total number of components on the vehicle

B. In the trunk, under a rear seat, or in a similar location away from the engine compartment for packaging reasons

C. Underneath the hood in the exact same location as a conventional vehicle's 12-volt battery would be installed

D. Outside the vehicle in a separate covered enclosure attached to the rear bumper for easy customer access

43. A scan tool with bidirectional control on a hybrid vehicle can:

A. Permanently disable the HV system through a software command sent through the OBD-II diagnostic connector

B. Command specific components on or off, such as the electric coolant pump, for diagnostic verification testing

C. Bypass the HV system's safety interlocks to allow energized work on the vehicle during diagnostic procedures

D. Reprogram the HV battery pack's capacity rating to match the requirements of a different vehicle application

44. When replacing a single cell module within a hybrid HV battery pack, the technician must:

A. Replace the cell module without any preliminary diagnostic work to save shop labor time and customer costs

B. Replace all the cell modules in the pack at once to ensure the entire pack has matching cells from the same batch

C. Use any compatible cell module from a salvage vehicle to provide the lowest-cost option to the vehicle customer

D. Match the replacement module's specifications closely (capacity, voltage, age) and perform OEM initialization

45. The final safety check before releasing a hybrid vehicle to the customer after HV service work should include:

A. Verification of correct torque on HV connections, restoration of safety covers, isolation testing, and a road test

B. Only a brief road test to ensure the vehicle starts and drives, without any other safety verification procedures

C. Disconnecting and reconnecting the 12-volt battery to clear any stored fault codes from previous service work

D. Replacing the HV service plug fuse as a precaution against subsequent failures during normal vehicle operation

ANSWER KEY — PRACTICE EXAM 20 (Q1–Q45)

1. A — The HV power distribution unit (HVJB or HV junction box) is the central HV switching point and houses the main contactors, pre-charge circuit, current sensor, and main HV fuse. Centralizing these components simplifies wiring and allows the hybrid control module to manage HV isolation from one location. Understanding its contents is critical for HV diagnosis.

2. C — Excessive ripple on the DC bus voltage indicates a DC link capacitor that has lost capacitance and can no longer smooth the bus voltage between IGBT switching cycles. A pre-charge resistor failure prevents power-up rather than producing ripple, and a normal bus shows only small ripple. A failing DC link capacitor typically progresses to a hard inverter fault.

3. B — A single phase reading significantly lower than the other two indicates an open or high-resistance path in that phase — possibly an IGBT, a phase conductor, or a winding connection. A healthy three-phase motor produces three balanced currents that match each other in amplitude and shape. Imbalance identifies the affected phase for targeted diagnosis.

4. D — Wireless charging on plug-in hybrids and EVs uses inductive coupling between a ground-mounted primary coil and a vehicle-mounted secondary coil, transferring energy through alternating magnetic fields. Direct contact, optical, and RF-broadcast methods are not used in production wireless charging. Alignment and coil distance affect transfer efficiency.

5. C — A 240-volt single-phase EVSE in a North American residential installation connects across the two 120-volt phase legs of the split-phase service, with the two legs providing 240 V between them. Single-phase 120 V and three-phase 480 V are not appropriate sources. Correctly understanding the supply is essential when sizing and installing the EVSE circuit.

6. A — The Ford eCVT is a power-split hybrid that uses two motor-generators arranged with a planetary gear set, operating on the same principles as the Toyota Hybrid Synergy Drive. It is not a mild hybrid, series-only, or torque-converter design. Recognizing the architecture guides the diagnostic strategy for MG1/MG2 and planetary concerns.

7. D — Hybrid vehicles commonly include active grille shutters, smooth underbody panels, and low-drag wheel designs to reduce aerodynamic losses and stretch fuel economy. These features change inspection points compared to a conventional vehicle. Damage to underbody panels or stuck shutters can degrade efficiency and trigger codes.

8. B — Cylindrical lithium-ion cells named 18650 and 21700 use a standardized naming convention in which the first digits give the diameter in millimeters and the remaining digits give the length in millimeters. The format is rigid and metal-cased, not flat polymer. Recognizing the dimensions clarifies module construction and replacement compatibility.

9. A — Insufficient torque on HV battery terminal bolts creates high contact resistance that heats and arcs under load, while excessive torque can damage cell terminal posts and threads. Both conditions are unsafe and can lead to terminal failure or thermal events. A calibrated torque wrench set to the OEM spec is the only correct method.

10. C — HV bus voltage is measured at the OEM-designated test points or read from scan tool data while observing all HV safety procedures, including PPE, de-energization, and meter verification. Piercing cable insulation, applying probes directly across pack terminals in ready mode, or relying on 12-volt disconnection are unsafe shortcuts. Using designated test points protects technician and equipment.

11. D — Hybrid HV battery modules use NTC thermistors whose resistance changes predictably with temperature, providing a low-cost, robust input the BMS converts into cell or module temperature. Thermocouples, RTDs, and mercury thermometers are not used in this application. Recognizing the sensor type guides diagnosis of temperature-related codes.

12. C — Maximum continuous power equals supply voltage times current: 240 V × 32 A = 7,680 W. The EVSE protocol allows the vehicle to draw up to that limit. Confusing watts with watt-seconds, halving the current, or misapplying the meter voltage rating produces wrong answers.

13. A — The SAE J1772 Type 1 connector is the standard AC charging connector used in North America for Level 1 and Level 2 charging on most modern plug-in hybrids and EVs. Europe predominantly uses the Type 2 connector. Knowing the connector standard for the region is essential when sourcing EVSE equipment.

14. B — An arc flash event releases a high-temperature plasma ball, intense ultraviolet and visible light, blast pressure, and shrapnel from vaporized conductors. Energy levels can produce severe burns, hearing loss, and projectile injuries within milliseconds. PPE selection is driven by the calculated incident energy at the work location.

15. D — For routine hybrid HV work, safety glasses with side shields are the minimum standard, with an arc-flash-rated face shield added whenever the technician is working on energized HV components. Tinted

welding goggles, prescription glasses without side shields, and polarized sunglasses do not meet the eye-protection requirements. PPE level scales with task exposure.

16. C — Hybrid wheel speed sensors feed the ABS/regen brake controller, which uses the signals for both anti-lock function and regenerative braking control, blending regen and friction braking accurately. They do not connect directly to the inverter or engine control module. Wheel speed sensor faults can disable both ABS and regen.

17. A — A 12-volt battery monitoring system (often called an IBS, Intelligent Battery Sensor) uses a current sensor on the 12-volt battery cable to report battery state of charge, current, and temperature to the body or power management module. It is integrated, not standalone or wireless. Faults here can mimic battery or charging system concerns.

18. B — The HV system and 12-volt low-voltage system on a hybrid must be galvanically isolated so HV potential cannot reach the chassis through the LV system. The isolation monitor continuously verifies this separation. Loss of isolation is a safety-critical fault that immediately triggers contactor opening.

19. C — Power electronics coolant uses corrosion inhibitors compatible with the aluminum and copper components inside the inverter and motor cooling passages, combined with a low-conductivity base fluid that prevents leakage current paths. Conventional engine coolant additives and salt-water additives are not appropriate. Using the wrong coolant causes isolation faults.

20. D — Hybrid vehicles communicate through the OBD-II connector using CAN bus protocols (ISO 15765), and hybrid-specific modules typically require enhanced or OEM-level scan tool access beyond generic OBD-II powertrain reads. Older protocols and proprietary-only access are not the current standard. The scan tool must support the manufacturer's specific module list.

21. B — When an HV connector is disconnected, the first inspection is for damage, corrosion, contamination, and proper pin alignment on the connector pins and seal before any reconnection attempt. Skipping inspection risks high-resistance connections, isolation faults, and seal failures. Wire harness, paint, and 12-volt fuses are unrelated to connector mating quality.

22. B — Honda i-MMD uses two electric motors and a clutch: under most conditions the engine drives a generator while a separate motor drives the wheels (series operation), and a clutch engages at higher speeds for direct mechanical drive (parallel operation). It is not the same as the older Honda IMA system. Knowing the architecture clarifies the power flow under different driving conditions.

23. C — A hybrid HV battery pack carries a permanently affixed serial number on its label that identifies origin, manufacturing date, and warranty status. It is not the same as the vehicle VIN and is not generated by the technician. Recording the pack serial number is required for warranty claims and pack tracking.

24. D — Vehicle-to-vehicle (V2V) charging requires bidirectional charging capability on the source vehicle and a special adapter that connects the two vehicles' charging ports. Standard 120-volt outlets, wireless pads on bumpers, and 12-volt accessory outlets are not the mechanism. V2V is becoming more common on newer plug-in vehicles.

25. B — On a full hybrid, the accessory belt typically drives significantly fewer accessories than a conventional vehicle — often only the engine water pump or, on some platforms, nothing at all — because the A/C compressor, power steering, and starter/charge functions are electric. Recognizing the simplified belt drive helps identify failure modes specific to hybrids.

26. A — A hybrid vehicle's suspension is tuned for the additional weight and altered center of gravity caused by the HV battery pack and associated electric drive components. Spring rates, damping, and bushings are matched to the heavier vehicle. Substituting non-hybrid suspension parts can degrade ride, handling, and component life.

27. C — An "Inverter Bus Overvoltage" code during deceleration most commonly results from the HV battery being unable to absorb regenerative current quickly enough — typically because the SOC is high or a contactor or related fault has limited charge acceptance. The condition is energy-flow related, not a 12-volt, coolant sensor, or brake hydraulic concern. Diagnosis focuses on SOC, contactors, and the BMS path.

28. D — Some OEMs supplement the standard orange HV color with additional identifiers such as blue or yellow stripes to mark specific HV subsystems or voltage classes (for example, traction battery vs. air-conditioning compressor circuits). This goes beyond the basic orange identification. Knowing the color scheme prevents confusion during diagnosis.

29. B — On some hybrid platforms, the drive shaft includes a feature that electrically isolates the motor housing from the wheel hub to prevent stray currents from flowing through wheel bearings, which would erode bearing races. The shaft does not carry HV current or ground the HV system. This bearing-protection design extends component life.

30. A — A hybrid HV work area is marked with cones, barriers, or signs to keep unqualified personnel from entering the energized HV zone, as required by OSHA, NFPA 70E, and OEM service procedures. Yellow caution tape or "approved entry" green markings are not the standard. The marked boundary is part of safe work practice.

31. D — A proper HV test probe is CAT III 1000V rated with finger guards and a minimum exposed metal tip to reduce the risk of inadvertent shorts between adjacent conductors during testing. Improvised, uninsulated, or piercing probes are unsafe. Use of rated probes is part of HV-specific tooling requirements.

32. C — The Audi A3 e-tron and VW Golf GTE use a P2 parallel hybrid architecture with a single electric motor mounted between the engine and a dual-clutch transmission. This allows EV-only operation through the DCT when the engine clutch is disengaged. The architecture is not series, mild, or pure parallel without EV mode.

33. A — A hybrid battery test station capable of charging, discharging, and analyzing a removed pack is commonly called a hybrid battery cycler. It applies controlled current rates to evaluate cell condition, internal resistance, and total capacity. Conventional load testers and alternator benches are not designed for HV battery analysis.

34. A — The small-gauge wires running from each cell module to the BMS carry low-voltage sensing signals for individual cell voltage and temperature monitoring; they do not carry pack current, three-phase AC, or refrigerant. Damaged or corroded sensing wires produce false BMS readings and erroneous codes. Cell voltage and temperature accuracy depend on these wires' integrity.

35. C — A "high-pot" test is a high-potential dielectric withstand test that applies a high voltage between conductors and ground to verify the insulation can hold off voltage without breakdown. It is an electrical test, not a thermal, vibration, or pressure test. High-pot testing is part of HV system quality verification and may be performed during component manufacturing.

36. D — A removed HV battery pack should be stored within the manufacturer's recommended temperature range, typically moderate ambient temperatures, away from extreme heat or cold that could degrade cells or trigger thermal events. Storing at extremes or in operating-temperature conditions can damage the pack. Following the OEM storage spec protects warranty and safety.

37. A — A properly functioning hybrid inverter shows a relatively steady DC bus voltage on the scope, with a small ripple component at the IGBT switching frequency riding on top. Pure sine waves at line frequency, full square waves, and triangular sawtooth patterns would all indicate either a different signal or a malfunction. Scope interpretation supports DC link capacitor diagnosis.

38. C — A burned-open pre-charge resistor leaves the inverter's bus capacitors unable to charge before the main contactor commands close, so the hybrid control module aborts the startup sequence and the vehicle will not enter ready mode. The component is essential to the start-up sequence. Verification involves measuring the resistor and inspecting the pre-charge contactor circuit.

39. B — A hybrid maintenance schedule includes OEM-specified intervals for inverter coolant, transaxle fluid, brake fluid, and other lubricants and fluids, each on its own schedule. Annual pack replacement, monthly external charging, and quarterly connector replacement are not required. Following the published schedule protects components and warranty.

40. D — The body control module and the hybrid control module communicate over the vehicle's CAN bus network, so hybrid-related events (ready mode, EVSE plugged-in, auto-stop) can affect body electronics and vice versa. They do not use dedicated hardwire, OBD-II port, or wireless links for normal operation. Understanding the bus topology is essential when diagnosing intermittent body or hybrid faults.

41. C — Specified mating force on HV connectors ensures complete pin contact and proper engagement of the connector seal, preserving the HV connection's electrical integrity and weather protection. Loose connections cause heating; under-engaged seals admit moisture and create isolation faults. Connector engagement is verified by feel, audible click, and lock engagement.

42. B — Hybrid 12-volt auxiliary batteries are commonly mounted in the trunk, under a rear seat, or in a similar location away from the engine compartment for thermal and packaging reasons, including separation from HV battery off-gassing. Combining with the HV pack or attaching outside the body are not standard practices. Knowing the location prevents diagnostic confusion.

43. B — A scan tool with bidirectional control on a hybrid can command specific components on or off — such as the electric coolant pump, A/C compressor, or contactors — to verify operation during diagnosis. It cannot permanently disable HV, bypass safety interlocks, or reprogram pack capacity. Bidirectional testing is a powerful diagnostic technique when used correctly.

44. D — When replacing a single cell module within a hybrid HV battery pack, the replacement must closely match the existing modules in capacity, voltage, and age, and the OEM-specified pack initialization or relearn procedure must be performed. Mismatched modules accelerate imbalance; skipping initialization leaves codes set. This is the correct repair path even when the replacement is more expensive than a salvage module.

45. A — The final safety check before releasing the vehicle includes verifying correct torque on all HV connections, restoring all safety covers and labels, performing an isolation resistance test, and completing a road test that confirms smooth hybrid operation. Skipping these steps risks comebacks, isolation faults, and safety incidents. Documentation of these checks is required by OEM warranty procedures.