ASE L3 - Quiz Questions with Answers

A. Battery System

1.

How many commonly used battery type cells are there?

- **Three**
- Four
- Five
- Two

Correct answer: Three

There are three commonly used types of cells: pouch, prismatic, and cylindrical.

2.

Technician A says there is an inspection plug located on top of the HV battery trays. Technician B says the inspection plug is used to check for internal leaks. Which technician is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Technician B is correct. The inspection plug is used to check for internal leaks.

Technician A is incorrect. There is an inspection plug, but it's located under the battery tray.

3.

Technician A says most smaller service disconnect plugs contain an HV fuse. Technician B says vehicles with large service disconnect levers have the HV fuse located inside of the battery housing. Who is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

Most large service disconnect levers contain the fuse internally. In most vehicles with small disconnects, the fuse is located within the battery tray.

4.

Technician A says under normal conditions, disabling the low voltage system will also disable the HV system. Technician B says high voltage cables are orange.

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Both technicians are correct. On a normal operating HV with no faults, disabling the low voltage will also disable the HV system. The orange cables are for HV and can carry up to 800 volts.

5.

A battery pack rated at 200 volts reads 180 volts on a scan tool. Technician A says the battery pack is faulty and should be replaced. Technician B says the battery pack should be rebuilt. Who is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

Both technicians are wrong. Battery voltage varies depending on state of charge. It's normal for a battery rated at 200 volts to measure 180 volts or 220 volts on a scan tool, depending on the state of charge.

6.

How many types of digital multimeters are there?

- **3**
- 6
- 2
- 4

Correct answer: 3

There are 3 types of digital multimeters: industrial, insulation, and precision.

7.

Technician A says the DC-DC converter charges both the 12-volt and HV battery. Technician B says electrical problems with the charge port can cause DTCs. Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

The DC-DC converter charges the 12-volt battery as the HV battery is charging. Problems with the charge port can cause diagnostic trouble codes to set in multiple modules within the vehicle.

8.

Long-term high-voltage battery problems may result if the state of charge drops below:

- **20%**
- 10%
- 30%
- 40%

Correct answer: 20%

Long-term high-voltage battery problems may result from the State of Charge (SOC) dropping below 20%. Because of this, the SOC should be as high as possible before storing a hybrid for an extended period of time.

9.

Technician A says in many cases, the high-voltage service plug doesn't contain the main fuse. Technician B says, in an accident where a short circuit of the HV wires occurs, the HV fuse opens to protect the battery. Which technician is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Technician B is correct. When an accident occurs and there's a short circuit of the HV wires, the HV fuse is set to open to protect the battery from damage.

Technician A is incorrect. The main fuse is inside the high-voltage service plug on many hybrids, including the Toyota Prius.

10.

HV electrical connectors that require the use of tools to be separated are orange-colored. What color are the HV electrical connectors that don't need tools for separation?

Orange

Red

Black

Yellow

Correct answer: Orange

There are two types of HV connectors. One requires the use of special tools, the other does not, but both are colored orange. Any high-voltage connector that could put you into contact with live voltage must be orange.

Non-high-voltage connectors will not be orange. The color used will depend upon the manufacturer.

11.

Most medium-sized PHEV batteries have which of the following ratings?

18 kWh at 390V or less

1.5 kWh at 300V or less

100 kWh at 390V or less

12 kWh at 300V or less

Correct answer: 18 kWh at 390V or less

A medium-sized Plug-in Hybrid Electric Vehicle (PHEV) battery typically has a rating of 18 kWh at 390V or less. Usually, they are air-cooled and heated with blower fans or liquid-heated and cooled.

Small-size HEV batteries usually have a rating of 1.5 kWh at 300V or less, while the large-size BEV battery measures 100 kWh at 390V or less.

12.

Technician A says a high-voltage battery cell can be tested with a CAT III multimeter. Technician B says cotton clothing should be worn when working on HV batteries. Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Both technicians are correct. Battery cell voltage can be checked with a CAT III multimeter. Cotton clothing should be worn because it is less flammable than synthetic clothing.

13.

Technician A says some vehicles use the A/C system to cool the hybrid battery. Technician B says some vehicles use engine coolant to cool the hybrid battery. Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Both technicians are correct. Various methods of battery cooling are used, depending on the make/model of the vehicle. Some vehicles use the A/C system for battery cooling, while others use engine coolant.

14.

How many Toyota HEV smart key modes are there?

5 or 6 depending on the model year

3 or 4 depending on the model year

2 or 3 depending on the model year

1 or 2 depending on the model year

Correct answer: 5 or 6 depending on the model year

There are 5 or 6 smart key modes. Emergency off mode is model dependent.

15.

Technician A says safety cones should be placed around a vehicle when working on the HV system. Technician B says the key/key fob should be located at least 12 feet away from a vehicle during HV system service. Which technician is correct?

Technician A

Both A and B

Technician B

Neither A nor B

Correct answer: Technician A

Technician A is correct. Safety cones and warning signs should be placed around a vehicle to notify other people that it is a dangerous area.

Additionally, technician B is incorrect because the key/key fob should always be a minimum of 16.4 feet away from the vehicle during HV system service.

16.

What is the voltage that most manufacturers recommend for the use of PPE when working above?

50V AC or 50V DC

12V AC or 12V DC

20V AC or 20V DC

220V AC or 220V DC

Correct answer: 50V AC or 50V DC

Most of the manufacturers recommend PPE when working with voltages greater than 50V AC or 50 V DC.

17.

While many HVs use a conventional 12V AGM or lead-acid battery to power the conventional electrical system, Tesla introduced a lithium-ion battery with how many volts?

16V

14V

12V

18V

Correct answer: 16V

Tesla released a 16V lithium-ion battery that replaces the role of a standard 12V. It also supports advanced electronics.

For most HVs, the 12V lead-acid or AGM battery is still used for conventional systems.

18.

On a J1772 DCFC level 1 ccs charging connector, how many pin ports are there?

- **7**
- 6
- 4
- 8

Correct answer: 7

There are 7 pins on a J1772 connector combo type 1.

19.

What is the optimal target state of charge for a high-voltage battery?

- **50%**
- 100%
- 85%
- 90%

Correct answer: 50%

The State Of Charge (SOC) is a calculation based on battery voltage, temperature, and current. Optimally, the target SOC is 50%, with a range between 20% and 80%.

20.

Technician A says if a high-voltage battery is to be removed, a powertrain lift or battery lift should be used without a battery support fixture. Technician B says a battery can be twisted and damaged if support fixtures are not used correctly, leading to a possible fire. Which technician is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Technician B is correct and technician A is incorrect. While it's important to use proper lifts when removing HV batteries, they must be used with the right battery support fixtures. If not, battery damage and personal injury can occur, possibly leading to a fire.

21.

What is the general manufacturer time frame to allow HV capacitors to discharge before testing the HV system?

5-15 mins

2-4 mins

45-60 mins

15-30 mins

Correct answer: 5-15 mins

Generally, it takes 5-15 minutes for the HV capacitors to discharge.

22.

How many size categories are there for automotive HV batteries?

- **Three**
- Two
- Four
- Seven

Correct answer: Three

There are three size categories for automotive HV batteries: small, medium, and large.

23.

All of the following locations can hold HV fuses, except:

Interior fuse box

Battery junction block

Power distribution box

Under the cover of the HV battery

Correct answer: Interior fuse box

The interior fuse box will not have any HV fuses installed. Instead, the HV fuses can be found in the battery junction block, in the power distribution box, in the battery, or under the cover of the HV battery.

24.

Technician A says all HV battery systems have a separate cooling system only used for the HV battery. Technician B says all HV vehicles use refrigeration systems to cool the battery compartment. Who is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

Both technicians are wrong. Only some vehicles use refrigerant systems to cool the battery compartment. The Nissan Leaf EV has no cooling system for its HV battery.

25.

Technician A says voltage balancing must be performed with a scan tool on all vehicles. Technician B says some vehicles require a special tool to perform voltage rebalancing. Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Only technician B is correct. Balancing is different from vehicle to vehicle. Some GM and Toyota vehicles require a special Midtronics tool to perform balancing.

26.

Technician A says if a 12V battery is found inside the passenger compartment or trunk, it must be externally vented. Technician B says the 12V battery can't be jumped using a traditional jump box. Which technician is correct?

Technician A

Both A and B

Technician B

Neither A nor B

Correct answer: Technician A

Technician A is correct. Many hybrids have a 12V battery in the trunk or passenger compartment, but these batteries must have external venting.

Technician B is incorrect because the 12V battery can be jumped with a traditional jump box, just as you would do with a conventional ICE vehicle.

27.

Typically, how long should you wait to service a high-voltage system after removing the service plug?

5 to 10 minutes

10 to 20 minutes

30 to 45 minutes

45 minutes to an hour

Correct answer: 5 to 15 minutes

Typically, you need to wait 5 to 15 minutes to service a high-voltage system after removing the service plug.

28.

The safety rescue hook is insulated up to how many volts?

- **1000 volts**
- 2000 volts
- 500 volts
- 1900 volts

Correct answer: 1000 volts

The HV rescue hook is an essential PPE and is insulated up to 1000 volts.

29.

Technician A says an AGM battery can be charged using a traditional battery charger. Technician B says an AGM type of battery may experience thermal runaway when using a conventional charger. Which technician is correct?

Technician B

Technician A

Neither A nor B

Both A and B

Correct answer: Technician B

Only technician B is correct. Absorbent Glass Mat (AGM) batteries must be charged with a specific charger or thermal runaway may occur. However, an AGM charger can be used to charge any type of battery. So, if there is a question as to what kind of 12V battery you can charge, default to using an AGM charger.

30.

Most PHEV and HV vehicles use an HV battery with up to how many cells?

- **96**
- 86
- 76
- 56

Correct answer: 96

Most HV batteries in vehicles contain up to 96 cells.

31.

Technician A says HV vehicles only use AGM 12 volt batteries for the low voltage system. Technician B says HV vehicles use 12V lead-acid or AGM batteries for the low voltage system. Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Only technician B is correct. HV vehicles still use a 12 volt system and can use AGM or lead-acid type batteries.

32.

All the following should be done to disable a high-voltage battery pack **except**:

Disconnect the hybrid control module

Remove the service plug

Test the high-voltage parts using a CAT III multimeter

Disconnect the 12-volt battery

Correct answer: Disconnect the hybrid control module

Before working on a high-voltage system, the battery must be isolated. In most cases, this procedure includes disconnecting the 12-volt battery, removing the high-voltage service plug, and testing the high-voltage parts using a CAT III multimeter.

33.

High-voltage battery cells are connected in which manner?

- **Series**
- Parallel
- Series-parallel
- Perpendicular

Correct answer: Series

Hybrid battery cells are connected in series to create the required high voltage.

34.

Which type of 12-volt battery includes a glass mat?

AGM 12 volt

Lead acid 12 volt

Lithium-ion 12 volt

Nickel-metal hydride 12 volt

Correct answer: AGM 12 volt

An AGM 12-volt battery includes a glass mat. An AGM 12-volt battery also doesn't "gas" or lose water.

35.

According to the HYBRID/ELECTRIC VEHICLE SPECIALIST CERTIFICATION TEST REFERENCE BLOCKS, all motor/generators are what phase high voltage?

3-phase AC voltage

2-phase AC voltage

3-phase DC voltage

2-phase DC voltage

Correct answer: 3-phase AC voltage

Block voltage can be viewed on a scan tool. Variation between battery modules should not exceed 0.2 volts.

36.

Technician A says prismatic battery cells are of a round shape. Technician B says prismatic battery cells are primarily produced by Sony electric. Who is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

Both technicians are wrong. Prismatic batteries are box-shaped and mostly produced by panasonic electric

37.

According to the HYBRID/ELECTRIC VEHICLE SPECIALIST CERTIFICATION TEST REFERENCE BLOCKS, all systems are equipped with what voltage battery?

12 volts

390 volts

24 volts

300 volts

Correct answer: 12 volts

All systems are equipped with a 12-volt battery.

38.

What is the interlock system's purpose?

To signal the computer in charge of the HV capacitors if the vehicle has been in a collision

If the service plug has been removed

If the inverter cover is off

If there is a high-voltage insulation leak

Correct answer: To signal the computer in charge of the HV capacitors if the vehicle has been in a collision

To determine if the vehicle has been in a collision, the ECU uses information from the interlock system. If a collision is detected, the ECU will open the system's main relays to isolate the high-voltage battery.

39.

All three of the vehicle types (Type-1, Type-2, and Type-3) use what battery chemistry in their high-voltage battery packs?

The information is not specified.

Lead-acid

Nickel-metal hydride (NiMH)

Lithium-ion (Li-ion)

Correct answer: The information is not specified.

Information regarding the battery chemistry used in the various vehicle types is not specified. However, most hybrid and electric vehicles currently use lithium-ion (Li-ion) batteries. Some older models use nickel-metal hydride (NiMH) battery technology.

40.

Technician A says a high-voltage battery can overheat if the SOC drops below 20%. Technician B says a high-voltage battery can overheat if the SOC climbs above 80%. Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Both technicians are correct. A high-voltage battery can overheat if the State Of Charge (SOC) drops below 20% or if the SOC climbs above 80%. For this reason, the SOC is very closely monitored by the control module.

41.

What is the purpose of the positive contactor in a HV system?

To connect the HV battery terminal to the HV battery cable

To connect the HV battery to the 12-volt battery

To connect the HV battery to the HV junction

To connect the 12-volt battery to the alternator

Correct answer: To connect the HV battery terminal to the HV battery cable

The positive contactor connects the positive cable and positive terminal of the HV system.

42.

On all hybrid vehicles, the 12-volt battery is used to do everything **except**:

Power the starter

Keep the system memory alive

Power the 12-volt accessories

Enable the high-voltage battery to connect to the hybrid system

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Correct answer: Power the starter

Most hybrids do not have a 12-volt starter. Instead, the hybrid motor is used to crank the engine.

43.

Technician A says some vehicles can have the high-voltage battery rebalanced with a scan tool. Technician B says it's not possible to rebalance a high-voltage battery manually. Who is correct?

Technician A

Technician B

Both A and B

Neither A nor B

Correct answer: Technician A

Only technician A is correct. Some vehicles can have the high-voltage battery rebalanced with a scan tool, while others must have the high-voltage battery rebalanced manually.

44.

Technician A says lead-acid batteries are preferred when the battery is installed inside the vehicle. Technician B says the 12V battery can be installed in the trunk area of an HEV. Which technician is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Technician B is correct. The 12V battery can be located in the passenger compartment, trunk, or hatch area of an HEV.

Technician A is incorrect because AGM batteries should be used inside vehicles. AGM batteries contain very little liquid compared to lead-acid batteries, which are flooded and can spill electrolytes if damaged.

45.

Which of the following charging devices supplies 50 to 1000 volts DC at 400 amps?

DC level 2

DC level 1

AC level 1

AC level 2

Correct answer: DC level 2

DC level 2 charging charges up to 1000 volts and 400 amps.

46.

Technician A says TSB's should be checked before attempting to diagnose HV battery issues. Technician B says Battery Energy Control Modules are a common failure in HV systems. Who is correct?

Technician A

Technician B

Both techncians

Neither technician A nor B

Correct answer: Technician A

Only technician A is correct. Service bulletins should be checked prior to performing any diagnostics on HV batteries. Battery Energy Control Modules rarely fail.

47.

Technician A says deionized water should be used when mixing coolant for an HV vehicle cooling system. Technician B says distilled water should be used when mixing coolant for an HV vehicle cooling system. Who is correct?

Technician A

Technician B

Both A and B

Neither A nor B

Correct answer: Technician A

Technician A is correct. Deionized water is not conductive and is the only water that should be used when mixing coolant for an HV vehicle.

48.

Technician A says the battery tray on a PHEV holds the battery internal components. Technician B says on several HEV vehicles, the battery tray is located on the inside of the vehicle.

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Both technicians are correct. The battery tray houses the battery, and in many vehicles it is located inside.

49.

Which type of battery resembles the batteries purchased at the hardware store?

Cylindrical

Prismatic

Oblong

Rectangular

Correct answer: Cylindrical

Cylindrical type batteries look similar to the battery you may find at the hardware store. You may also find these batteries in many home items such as a TV remote control.

50.

Technician A says the 12-volt battery on an HV can propel the vehicle under downhill conditions. Technician B says the 12-volt battery can be used for the infotainment system. Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Only technician B is correct. The 12-volt battery is never used to propel the vehicle. The 12-volt battery can be used for low voltage systems such as infotainment.

51.

On a plug-in hybrid, the 12V battery is charged by what?

DC-to-DC converter

Charging cord

Alternator

Generator

Correct answer: DC-to-DC converter

All hybrids use the DC-to-DC converter to charge the 12V battery and run the 12V system after start-up.

It will not be charged by plugging the hybrid in, nor through an alternator or generator.

52.

How much does a 2017 Chevrolet Bolt battery weigh?

1000 lbs.

2000 lbs.

1500 lbs.

500 lbs.

Correct answer: 1000 lbs.

The 2017 Chevrolet Bolt battery weighs 1000 lbs.

53.

Technician A says a battery cell is a pair of electrodes submerged in an electrolyte solution. Technician B says a battery cell is a collection of electrodes connected in series. Who is correct?

Technician A

Technician B

Both A and B

Neither A nor B

Correct answer: Technician A

Only technician A is correct. A cell is a pair of electrodes submerged in an electrolyte solution. A battery is a collection of cells connected in series.

54.

All the following battery types are currently used as hybrid high-voltage batteries, except:

Lithium cobalt oxide

Lithium-ion

Lithium-polymer

Nickel-metal hydride

Correct answer: Lithium cobalt oxide

Lithium cobalt oxide batteries do not perform well in high-load applications. These batteries tend to be used in consumer electronics, such as phones and tablets.

All the other battery types are currently used as high-voltage hybrid batteries.

55.

Technician A says class zero gloves should be sent out every 12 months to be tested. Technician B says class zero gloves should be sent out every 6 months to be tested. Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Only technician B is correct. Electrical testing by a laboratory should be done every 6 months.

56.

Which of the following is the **first** step to take before removing a high-voltage battery?

Make sure the ignition key is removed and the vehicle is in "not ready" mode

Remove the negative 12-volt battery cable

Remove the high-voltage service plug

Test the voltage at the battery cables with a CAT III meter

Correct answer: Make sure the ignition key is removed and the vehicle is in "not ready" mode

Although all the options are steps that should be taken before removing a high-voltage battery, the first step is to make sure the ignition key is removed and the vehicle is in "not ready" mode.

57.

Technician A says a boost converter is used to boost hybrid battery voltage.
Technician B says a boost converter helps provide more power to the electric motors.
Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Both technicians are correct. A boost converter is used to boost hybrid battery voltage to provide more power to the electric motors.

58.

Technician A states that the best way to extend the life of the lithium-ion battery is to allow it to discharge completely before recharging. Technician B states that the battery charge should be between 10% and 90% to extend its life. Which technician is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

Both technicians are incorrect. To extend the life of a lithium-ion battery, it's best to keep it charged between 20% and 80%. Some PHEVs prevent drivers from using the bottom or upper 20 percent, such as the Chevrolet Volt.

B. Internal Combustion Engine

59.

Technician A says wet compression tests can be performed on HEV vehicles. Technician B says there shouldn't be more than a five percent variation between cylinders. Which technician is correct?

Technician A

Both A and B

Technician B

Neither A nor B

Correct answer: Technician A

Technician A is correct. Conventional testing such as vacuum and wet/dry compression tests can be performed on HEV vehicles.

Technician B is incorrect. As a general rule, there should be no more than a 10 percent variation between the cylinders.

60.

Which of the following is TRUE regarding performing a compression test on a hybrid vehicle?

A scan tool must often be used to perform the test.

There should be no codes stored in the memory following the test.

There should be no unusual sounds indicating a mechanical problem during the test.

The inverter must be disconnected before performing the test.

Correct answer: A scan tool must often be used to perform the test.

On many hybrid vehicles, a scan tool must be used before performing a compression test. This is done to place the vehicle in a specific diagnostic mode.

The inverter doesn't need to be disconnected to perform a compression test. However, there could be strange sounds that indicate a mechanical problem, usually caused by the engine cranking over by MIG through a transmission torque damper. These sounds are considered normal. It's also normal to have codes stored in the system following the compression test. These codes can be cleared with a compatible scanner.

61.

The general procedure of compression testing an Atkinson engine is to

disable the fuel while having a lab scope connected to the battery.

disable the fuel while having a scan tool connected to the vehicle.

disable the spark while having a lab scope connected to the battery.

disable the spark while having the scan tool connected to the vehicle.

Correct answer: disable the fuel while having a lab scope connected to the battery.

Disabling the fuel while having a lab scope connected to the battery is the general procedure for compression testing an Atkinson cycle engine.

62.

Technician A says some hybrid vehicles need a scan tool to bleed the cooling system. Technician B says vacuum pumps are sometimes needed to bleed hybrid vehicle cooling systems. Who is correct?

Both A and B

Technician A

Technician B

Neither technician A nor B

Correct answer: Both A and B

Scan tools and vacuum pumps are sometimes needed to perform a bleeding procedure for cooling systems.

63.

All the following are true regarding a compression test on an HEV Atkinson cycle ICE **EXCEPT**:

The specifications for relative compression testing are located in the vehicle owner's manual.

Performing a relative compression test on an Atkinson cycle HEV is a complicated procedure.

Some factory scan tools make relative compression testing available through the scan tool.

A lab scope can be used for relative compression testing an Atkinson cycle ICE engine.

Correct answer: The specifications for relative compression testing are located in the vehicle owner's manual.

The specifications for compression testing vehicles are located within the service manual, not the owner's manual.

64.

How many methods are there to keep a Toyota Prius running continuously?

Two

Three

Four

Five

Correct answer: Two

There are two methods to get the Toyota Prius to run continuously for diagnostic purposes.

65.

A Toyota Prius doesn't crank and doesn't start. Technician A says this could be caused by a missing hybrid service plug. Technician B says this could be caused by an overfilled crankcase. Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Some of the causes of a Toyota Prius exhibiting a no-crank, no-start condition are a faulty 12-volt battery, a missing hybrid service plug, or an overfilled crankcase.

66.

Technician A says all hybrid vehicles can use the high voltage battery to jump start the vehicle. Technician B says no hybrid vehicles can use the high voltage battery to jump start the vehicle. Who is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

Ford manufactures some vehicles that can use the HV battery to jump start the vehicle.

67.

Technician A says most PHEV and HEV vehicles' ICE and HV systems share a common cooling system. Technician B says most HEV and PHEV vehicles have multiple separate cooling systems. Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Most HEV and PHEV vehicles use multiple, independent cooling systems. Sometimes up to three. The ICE cooling, HV component cooling, and HV battery cooling.

68.

Technician A says a crank, no start condition is usually caused by a problem related to the ICE. Technician B says a crank, no start condition is usually caused by the high voltage system. Who is correct?

Technician A

Technician B

Both A and B

Neither A nor B

Correct answer: Technician A

Crank, no start conditions are usually caused by a fault within the ICE system.

69.

Technician A says car carriers should be used to tow HEV vehicles. Technician B says light duty wreckers should be used to tow HEV vehicles. Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Only light duty wreckers or car carriers should tow disabled hybrid vehicles.

70.

Which wheels should be off the ground when towing an HEV?

The drive wheels

The rear wheels

The front wheels

Whichever wheels make it easier to get the vehicle safely attached to the tow truck

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Correct answer: The drive wheels

The drive wheels should be off the ground when towing an HEV; otherwise, damage can occur to the vehicle. The drive wheels may be the front, the rear, or all, depending on the vehicle.

71.

Technician A says Otto cycle engines will show lower vacuum readings than Atkinson cycle engines. Technician B says Otto cycle engines will show high vacuum readings. Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Otto cycle engines will show more vacuum than Atkinson cycle engines due to the Atkinson cycle keeping the intake valve open for an extended period of time.

72.

Technician A says many HEV and PHEV ICEs use the Atkinson cycle. Technician B says most conventional gasoline engines use the Otto cycle ICE. Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Many HEV and Phev ICEs use the Atkinson cycle as compared to the conventional gasoline engine that uses the Otto cycle.

73.

All the following are true regarding a hybrid Internal Combustion Engine (ICE) EXCEPT which of the following?

The ICE is used to charge the 12V battery.

Most engines are Atkinson cycle ICEs.

The ICE may start at any time during service.

The ICE may start in an attempt to charge the hybrid battery.

Correct answer: The ICE is used to charge the 12V battery.

Unlike a typical gasoline-only vehicle, the ICE does not need to be turning for the 12V battery to charge in a hybrid ICE. This is because the battery is not charged by an alternator. Instead, the 12V battery is charged by the DC-to-DC converter.

The majority of internal combustion engines installed in a hybrid are Atkinson cycle. It's also true that the ICE can start at any time during service.

74.

On which engine is the expansion ratio higher than the compression ratio?

Atkin cycle engine

Otto cycle engine

Rotary engine

Wankel engine

Correct answer: Atkin cycle engine

The Atkin cycle engine has a higher expansion ratio than the compression ratio. Rotary and Wankel engines are not used in HV vehicles.

75.

Technician A says the ICE in a hybrid has a higher compression than Otto cycles. Technician B says Otto cycle engines have a higher compression. Which technician is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Most hybrid vehicles use an Atkinson cycle engine, which has lower compression than Otto cycle engines due to the intake valve being held open longer than usual. For this reason, technician B is correct.

76.

Technician A says jump-starting HEV and PHEV vehicles is always performed the same way. Technician B says jump-starting HEV and PHEV may be different from vehicle to vehicle, and service information should be checked.

Technician B

Technician A

Technician A and B

Neither technician A nor B

Correct answer: Technician B

Technicians should never jump-start a PHEV vehicle without checking the service procedure in a service manual as it may be different from one vehicle to the next.

77.

Technician A says it is common that the coolant reservoirs for the HEV and ICE to be located close together. Technician B says HEV reservoirs are never located close together.

Technician A

Both A and B

Neither A nor B

Technician B

Correct answer: Technician A

Technician A is correct. Often the HEV and ICE cooling system reservoirs are close together. It is important to identify the correct one.

78.

Technician A says it is inappropriate to continuously run an ICE for diagnostic purposes. Technician B says there are three methods on the Toyota Prius to keep the engine running. Which technician is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

Both technicians are wrong. Sometimes it is a necessity to run the ICE for diagnostic procedures. However, caution should always be taken when diagnosing an engine with it running.

There are two methods to keep the Toyota Prius ICE running, although other models may have differing methods.

79.

Technician A says auto stop/idle-stop helps achieve better fuel economy in today's vehicles. Technician B says auto stop/idle-stop is only used on hybrid vehicles.

Technician A

Technician B

Both A and B

Neither A nor B

Correct answer: Technician A

Only technician A is correct. Today's HEV and non-HEV vehicles achieve great fuel mileage using auto stop/idle-stop.

80.

In comparison to an Otto cycle engine, an Atkinson cycle engine does which of the following?

Keeps the intake valve open longer

Closes the intake valve sooner

Keeps the exhaust valve open longer

Closes the exhaust valve sooner

Correct answer: Keeps the intake valve open longer

An Atkinson cycle engine keeps the intake valve open longer. This allows some of the cylinder volume to be forced back into the intake manifold to reduce pumping losses.

81.

Most HEV and PHEV vehicles on American roads use what ICE engine?

Atkinson cycle engine

Rotary engine

Three-phase induction motor

Otto cycle engine

Correct answer: Atkinson cycle engine

The majority of HEV and PHEV models driven today have a traditional Atkinson cycle engine. While the rotary engine and Otto cycle engine are both ICE, these aren't used in today's hybrids.

The three-phase induction motor is an electric motor, not an Internal Combustion Engine (ICE).

82.

How many seconds does the power button need to be held to put a Chevrolet Volt into service mode?

Five

Two

Three

Ten

Correct answer: Five

To place the Volt into service mode, hold the power button for five seconds.

83.

Technician A says working on the HEV ICE is the same as working on traditional gasoline engines. Technician B says the ICE in hybrid vehicles is worked on differently from the traditional gas engine. Which technician is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Technician A is incorrect. Even though both cars have an internal combustion engine, there are differences, making technician B correct.

Among the differences, the ICE may only run under certain conditions in the HEV.

84.

Technician A says on many HEV and PHEV vehicles, ICE is running whenever the vehicle is moving. Technician B says the ICE is only allowed to run under certain conditions. Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Only technician B is correct. On many HEV and PHEV models, the ICE is only allowed to run under certain conditions.

85.

Technician A says trapped air in a cooling system will eventually bleed out on its own. Technician B says improper coolant bleed procedures can cause engines to overheat and cause potential damage.

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Only technician B is correct. Not performing the cooling system bleed and fill procedures correctly can cause air to stay in the system.

86.

According to the Hybrid/Electric Vehicle Specialist Certification Test Reference Blocks, all systems are equipped with a DC/DC converter to replace which component?

Alternator

12V battery

Electric motor

Battery pack

Correct answer: Alternator

Every system contains a DC/DC converter that supplies stepped-down voltage to the 12V system. This converter replaces the traditional alternator (generator).

This system doesn't replace the 12V battery, battery pack, or electric motor.

87.

What RPM will a Toyota Prius idle at when in the mode for continuous running for diagnostics?

1000 RPM

750 RPM

550 RPM

1200 RPM

Correct answer: 1000 RPM

When the Prius is continuously running for diagnostics, it will idle at 1000 RPMs.

88.

Technician A says when diagnosing a no crank, no start condition ICE on a hybrid vehicle, make sure to check that the ICE is not seized mechanically. Technician B says to check for DTCs with a scan tool when diagnosing a no crank, no start condition.

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Both technicians are correct. When diagnosing an ICE for a no crank, no start, the ICE should be checked for free rotations, and DTCs should be checked using a scan tool.

C. Drive Systems

89.

The Toyota Prius HEV has how many antifreeze reservoirs?

Two

One

Three

None

Correct answer: Two

Toyota uses two antifreeze reservoirs in the Prius HEV. The first one is for the power electronics cooling system and maintains the temperature with the inverter, transaxle fluid, and DC-DC converter. The second reservoir is for the engine cooling system.

90.

How many brushless types of MGs do PHEV vehicles use?

- **2**
- 3
- 1
- 4

Correct answer: 2

There are two types of MGs PHEV vehicles use: AC synchronous permanent magnet and AC synchronous induction.

91.

Technician A says that tap water is an acceptable option for mixing with coolant during a fluid change in an HEV. Technician B says the Chevrolet Volt PHEV has three independent cooling systems. Which technician is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Technician B is correct. The Chevrolet Volt PHEV contains three fully independent cooling systems. One is for the power electronics system, another for the battery pack, and a final one for the engine.

Technician A is incorrect. Tap water is conductive. When changing the coolant in an HEV, either use pre-mixed coolants or water that is de-ionized.

92.

Resolver signals are used to calculate all the following **except**:

The integrity of the stator

The rotational speed of the rotor

The rotational direction of the rotor

The physical position of the stator

Correct answer: The integrity of the stator

Resolver signals are used to detect three things: the rotational speed of the rotor, the direction of rotation of the rotor, and the physical position of the rotor.

93.

What type of gloves should be worn when working on a high-voltage hybrid system?

Class 0

Class III

Class IV

Class VI

Correct answer: Class 0

When working on a high-voltage system, class 0 gloves rated at 1000 volts should be worn.

94.

Which module increases incoming AC voltage and converts it to DC voltage?

On-board charger module

Battery control module

Engine control module

Battery monitoring system

Correct answer: On board charger module

The on-board charger module steps up incoming AC voltage then converts it to DC voltage.

95.

Technician A says before towing a hybrid vehicle, the wheels should be chocked. Technician B says the drive wheels should be off the ground when towing a hybrid vehicle. Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Both technicians are correct. Before towing a hybrid vehicle, the wheels should be chocked, and the vehicle should be put into "off" mode. Then it should be towed with the drive wheels off the ground to prevent the motor/generator from producing AC voltage.

96.

Technician A says swapping two of three connections on a three-phase motor generator will cause it to spin backward. Technician B says permanent magnet motors are more efficient than AC synchronous induction motors. Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Both technicians are correct. AC synchronous induction motors are not as efficient as permanent magnet motors. Switching any two connections on a three-phase MG will cause the motor to spin in the opposite direction.

97.

The Toyota Prius is an example of which of the following?

Series-parallel hybrid

Series hybrid

Parallel hybrid

Micro hybrid

Correct answer: Series-parallel hybrid

The Toyota Prius is an example of a series-parallel hybrid. This design incorporates a power split device that allows for the power path from the engine to the wheels to be connected to either of the motor/generators.

98.

A hybrid vehicle exhibits a shudder when pushed in neutral. Which of the following is the **most** likely cause?

An open winding

A short between the stator phase windings and ground

Broken transaxle dampener springs

A failed transaxle planetary gear set

Correct answer: An open winding

A vehicle that is difficult to push and/or produces a thumping in neutral typically indicates an open winding.

99.

The resolver is a sensor used to detect which of the following?

The magnetic pole position of the MG

The position of the HV contactors

The HV battery cell position

The speed of the stator

Correct answer: The magnetic pole position of the MG

A resolver is a sensor that detects the magnetic pole position of the MG.

100.

Use the ASE Certification Test Reference to answer the following question.
Technician A says the Type-1 vehicle uses a 12-volt starter motor to crank the Internal Combustion Engine (ICE). Technician B says the Type-2 vehicle uses MG to crank the internal combustion engine.

Which technician is correct?

Technician B

Technician A

Neither A nor B

Both A and B

Correct answer: Technician B

Technician B is correct. The Type-2 vehicle uses a 12-volt starter motor or the MG. The Type-2 only has one MG.

Technician A is incorrect. The Type-1 vehicle uses MG1 to crank the ICE.