Electric and Hybrid Electric Vehicles, 1st Edition

Chapter 2

NAME _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

1. What are the items that will affect the range of an electric vehicle

2. What are the advantages and disadvantages of a series-hybrid design?

3. What are the advantages and disadvantages of micro, mild, medium, and full hybrids?

4. What are some of the advantages and disadvantages of owning an electric vehicle (EV)?

5. What is the purpose of the third motor in a three-motor hybrid system?

Answer Key
Testname: EV1SHORT02

1. Tips for range increase include:
   - Avoid high-speed driving because as the speed increases, the aerodynamic drag is increased by the square of the speed.
   - Avoid using the air-conditioning unless absolutely needed.
   - Check tire pressure. The door placard pressure offers the best compromise in terms of tire rolling resistance, braking distance, comfort, lateral dynamics, and wear.
   - Pre-condition the vehicle. As long as the vehicle is attached to the charging station, it makes sense to pre-condition the interior and to specify the departure time in winter, because the battery is only fully charged at the time of departure and is already at operating temperature.
   - Reduce weight by removing unnecessary additional weight and roof structures, such as bike racks unless being used.

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2. An advantage of a series-hybrid design is that no transmission, clutch, or torque converter is needed.
   A disadvantage of a series-hybrid design is the added weight of the ICE to what is basically an electric vehicle. The engine is actually a heavy on-board battery charger.
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3. A micro hybrid will incorporate idle stop, but is not capable of propelling the vehicle without starting the ICE. A micro-hybrid system has the advantage of costing less, but saves less fuel compared to a full hybrid vehicle.
   A mild hybrid will incorporate idle stop and regenerative braking, but is not capable of using the electric motor to propel the vehicle on its own without help from the ICE. A mild-hybrid system has the advantage of costing less, but saves less fuel compared to a full hybrid vehicle and usually uses a 42-volt electrical motor and battery package.
   A strong hybrid, also called a full hybrid, uses idle stop, regenerative braking, and is able to propel the vehicle using the electric motor(s) alone.
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4. There are many advantages of an electric vehicle compared to a vehicle powered by an ICE, which include the following:
   - Initial torque—Electric vehicles have high torque at the starting from a stop and can provide a rapid acceleration experience to the driver.
   - Better handling and stability—The high-voltage battery in an electric vehicle, being the heaviest electric component, is placed very low, on the body floor resulting in a very low Center of Mass. This gives the vehicle more stability, resulting in better handling for the vehicle.
   - Maximum traction —Electric motors are independently controlled, thereby providing precise control on each wheel for maximum traction in all wheel drive EVs.

   There are several disadvantages of an electric vehicle (EV) compared to an ICE vehicle including:
   - Limited range
   - Electrical needs at home
   - High initial cost

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5. Three-motor hybrid electric vehicles are usually two-motor hybrids that use an additional electric motor to propel the rear wheels for all-wheel-drive capability.
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