

Chapter 17

NAME _____

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

1. What are the differences in single-speed and two-speed gearing in an electric vehicle?

2. Describe the operation of a single-speed transmission in a typical electric vehicle.

3. What are the differences in FWD, RWD and AWD powertrain configurations?

4. Explain how the transmission delivers torque and optimizes fuel economy.

5. Explain how the Toyota power-split system delivers power to the drive wheels.

Answer Key

Testname: EV1SHORT17

1. Most all-electric vehicles are equipped with just a single speed transmission/transaxle, yet are capable of delivering outstanding performance and acceptable range with motor torque of up to 230 lb-ft (315 Nm) and peak power of 188 HP (140 kW). Using a multispeed transmission in an electric vehicle provides the same benefits that it does in a gasoline-powered vehicle with improved low-speed acceleration and increased efficiency by lowering the rotating speed of the electric motor at high speeds.
[Page Ref: 245-248](#)
2. The electric motor is a permanent-magnet synchronous AC motor. The final drive section of the drive unit consists of the drive gear on the output end of the electric motor, the main shaft, and the ring gear which is mounted on the differential assembly. The final drive assembly provides a gear reduction between the electric motor and the drive wheels.
[Page Ref: 245](#)
3. In rear-wheel-drive (RWD) applications, it is most common to use a transmission along with a driveshaft and differential at the rear axle to transmit torque to the drive wheels. In a front wheel-drive (FWD) vehicle, a transaxle assembly is used with half-shafts to transmit torque to the drive wheels. In a four-wheel-drive (4WD) or all-wheel-drive (AWD) vehicle, a transfer case or rear electric motor is used to distribute power to all four wheels.
[Page Ref: 229](#)
4. Torque is applied to the drive wheels to make the vehicle accelerate. The vehicle transmission is responsible for increasing engine torque in the lower speed ranges when acceleration is required, and then reducing engine speed for the best fuel economy when the vehicle is cruising.
[Page Ref: 229](#)
5. The power-split transaxle is a series-parallel hybrid technology. During most phases of vehicle operation, the system is operating as both series and parallel at the same time. While the control system is complex, the basic transaxle is very simple in design as it is built around a single planetary gear set (power-split device) and two electric motor/generators, called MG1 and MG2.
[Page Ref: 236-237](#)