

Name: _____ Date: _____

1. Explain the operational differences between a conventional zirconia oxygen sensor and a wide-band oxygen sensor in terms of air-fuel ratio detection range.

2. Describe the planar design introduced by Bosch in 1998 for wide-band oxygen sensors and its benefits over previous designs.

3. How does the heater circuit differ between conventional oxygen sensors and wide-band oxygen sensors in terms of amperage and operating temperature?

4. Discuss the significance of the heater in achieving closed-loop operation in a Toyota Highlander hybrid electric vehicle's wide-band oxygen sensor.

5. What are the construction features of a typical single cell wide-band oxygen sensor, and how does it differ from a conventional four-wire zirconia oxygen sensor?

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6. How does the PCM control a single cell wide-band oxygen sensor, and what does the milliamperere reading indicate about the air-fuel ratio?

7. Explain the principle of voltage generation in a conventional zirconia oxygen sensor when exposed to lean and rich exhaust conditions.

8. What is the role of the platinum electrodes in a conventional zirconia oxygen sensor, and how do they contribute to voltage generation?

9. Describe the dual cell design of a wide-band oxygen sensor and how it maintains stoichiometric balance through ion flow.

10. How does the PCM utilize the pump cell in a wide-band oxygen sensor to adjust the oxygen ion flow and maintain the desired voltage?
