

Automotive Electrical and Engine Performance 8th Edition
Chapter 19 – Narrow and Wide-Band Oxygen Sensors
Quiz A

1. What is the primary purpose of a wide-band oxygen sensor?
 - a. To provide a broader range of air–fuel ratio detection for precise engine control
 - b. To detect and prevent catalytic converter overheating
 - c. To measure exhaust gas recirculation (EGR) levels in real-time
 - d. To control engine temperature during high-speed operation

2. How does a zirconia oxygen sensor generate a voltage signal?
 - a. By measuring differences in air density between intake and exhaust
 - b. By comparing oxygen levels in exhaust gases and ambient air
 - c. By detecting pressure variations in the exhaust manifold
 - d. By using a strain gauge to monitor exhaust gas composition

3. What condition is indicated by a high oxygen sensor voltage (above 800 mV)?
 - a. Lean air–fuel mixture (high oxygen in exhaust)
 - b. Engine overheating due to low coolant levels
 - c. Rich air–fuel mixture (low oxygen in exhaust)
 - d. Catalytic converter efficiency failure

4. Why are heated oxygen sensors (HO2S) used in modern vehicles?
 - a. To reduce emissions during engine startup by quickly reaching operating temperature
 - b. To ensure more accurate readings during long idle periods
 - c. To improve sensor durability in high-temperature environments
 - d. To eliminate the need for pre-heated intake air

5. What is the expected voltage range of a properly functioning narrow-band oxygen sensor?
- 0.3–0.5 volts
 - 0.1–1.0 volts
 - 0.5–1.2 volts
 - 0.8–2.0 volts
6. What is a common cause of a false rich condition in oxygen sensor readings?
- Vacuum leaks in the intake manifold
 - Contaminated or fouled oxygen sensor
 - Excessive fuel injector pulse width
 - Ground connection failure
7. What advantage does a planar design offer for oxygen sensors?
- Faster warm-up time due to efficient heating
 - Resistance to high exhaust pressures
 - Greater compatibility with lean-burn engines
 - Improved detection of unburned hydrocarbons
8. What role does the PCM play in oxygen sensor diagnostics?
- It adjusts injector timing based on exhaust composition
 - It compares upstream and downstream sensor signals for catalytic converter efficiency
 - It regulates spark timing to match oxygen sensor outputs
 - It measures exhaust gas temperature using the oxygen sensor
9. Which of the following is a symptom of a malfunctioning oxygen sensor?
- Decreased engine vacuum pressure
 - Excessive ignition timing advance
 - Unstable idle and reduced fuel economy
 - Increased cylinder head temperature

10. What is the typical operating temperature range for a wide-band oxygen sensor?

- a. 800°F–1,000°F (427°C–538°C)
- b. 1,200°F–1,400°F (650°C–760°C)
- c. 600°F–800°F (315°C–427°C)
- d. 1,500°F–1,800°F (815°C–982°C)

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Correct Answers:

1. a
2. b
3. c
4. a
5. b
6. d
7. a
8. b
9. c
10. b