Automotive Electrical and Engine Performance 9th Edition
Chapter 40 – Vehicle Emission Standards and Testing
Multiple Choice Questions Quiz B

1. What is the stoichiometric air–fuel ratio for gasoline engines?

a. 12.6:1

b. 14.7:1

c. 16.2:1

d. 13.5:1

2. Which gas is primarily responsible for indicating a rich air–fuel mixture?

a. Oxygen (O_2)

b. Carbon monoxide (CO)

c. Carbon dioxide (CO_2)

d. Hydrocarbons (HC)

3. What is the primary cause of excessive hydrocarbon (HC) emissions in an engine?

a. Overheating coolant

b. Low oxygen levels in the atmosphere

c. Excessive exhaust backpressure

d. Engine misfire due to unburned fuel

4. How are oxides of nitrogen (NOx) formed during combustion?

a. From unburned hydrocarbons mixing with CO_2

b. By high combustion temperatures causing nitrogen to combine with oxygen

c. From incomplete combustion resulting in leftover oxygen

d. By excessive spark timing and lean mixtures

5. What is the acceptable range for carbon dioxide (CO_2) levels in the exhaust of a properly operating engine?

a. 12%–15%

b. 5%–8%

c. 18%–20%

d. 8%–10%

6. What condition might cause excessively high levels of CO in the exhaust?

a. Lean air–fuel mixture

b. Proper catalytic converter function

c. Rich air–fuel mixture

d. Low engine compression

7. Why is the exhaust gas recirculation (EGR) system important in controlling NOx emissions?

a. It prevents unburned fuel from escaping into the atmosphere.

b. It reduces combustion temperatures by recirculating exhaust gases into the intake manifold.

c. It allows oxygen to combine with carbon to form CO_2.

d. It diverts excess hydrocarbons back into the combustion chamber.

8. How is water (H_2O) formed as part of the exhaust gases?

a. Through oxidation of nitrogen molecules

b. By combining hydrogen in fuel with oxygen during combustion

c. By converting carbon monoxide into water vapor

d. By reducing hydrocarbons with a catalytic converter

9. What is the maximum allowable NOx level for a vehicle operating at wide-open throttle (WOT)?

a. 800 ppm

b. 1,000 ppm

c. 600 ppm

d. 400 ppm

10. What gas is typically measured in parts per million (ppm) rather than as a percentage in exhaust analysis?

a. Oxygen (O_2)

b. Carbon monoxide (CO)

c. Carbon dioxide (CO_2)

d. Hydrocarbons (HC)

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Answer Key Quiz B

Correct Answers:

1. b

2. b

3. d

4. c

5. a

6. c

7. b

8. a

9. b

10. d