Automotive Electrical and Engine Performance 8th Edition
Chapter 13 – Ignition System Operation, Diagnosis, and Service
Quiz B

1. What are the four basic functions of an ignition coil in a vehicle's ignition system?

a. Electromagnetic induction, current switching, voltage amplification, and spark generation

b. Voltage conversion, memory storage, spark distribution, and current retention

c. Alternator coupling, coil saturation, timing regulation, and discharge efficiency

d. Magnetic field buildup, resistance balancing, spark timing, and EMI shielding

2. Which component is responsible for triggering the primary ignition circuit?

a. Knock sensor

b. Crankshaft position sensor

c. Pickup coil or Hall-effect sensor

d. Distributor rotor

3. What is the primary purpose of a waste-spark ignition system?

a. To increase spark duration and efficiency

b. To fire companion cylinders simultaneously, one on the compression stroke and one on the exhaust stroke

c. To ensure that each spark plug receives uniform voltage

d. To reduce the complexity of distributor design

4. How does the Hall-effect sensor function in an ignition system?

a. Uses an analog pulse to generate varying voltages in the crankshaft sensor

b. Produces a digital voltage signal proportional to the magnetic field fluctuation

c. Creates high-frequency signals to control ignition timing

d. Converts electromagnetic pulses into spark plug discharge

5. What is the recommended resistance for a spark plug wire of 2 feet in length?

a. Less than 5,000 ohms

b. 10,000 ohms

c. 20,000 ohms

d. 16,000 ohms

6. Which method is used to diagnose an intermittent spark condition?

a. Spark tester measuring minimum 25,000 volts

b. Coil resistance check under no-load conditions

c. Oscilloscope capture of the ignition coil waveform

d. Crankshaft position sensor test for continuous RPM data

7. How do modern coil-on-plug systems improve ignition performance?

a. By centralizing ignition control through the distributor module

b. By eliminating spark plug wires to reduce electromagnetic interference

c. By providing uniform voltage to companion cylinders

d. By integrating knock sensors directly into each ignition coil

8. What is a key advantage of using iridium spark plugs?

a. Reduced voltage requirements due to smaller center electrodes

b. Longer spark duration under high-load conditions

c. Compatibility with waste-spark ignition systems only

d. Enhanced resistance to heat buildup and spark gap erosion

9. Which diagnostic tool is most effective for testing the primary winding resistance of an ignition coil?

a. Oscilloscope

b. Digital multimeter set to ohms

c. Inductive ammeter

d. Spark plug gap tester

10. What determines the initial timing of a spark plug in distributor-based ignition systems?

a. The direction of the coil winding

b. The base timing set to TDC or BTDC

c. The firing order defined by the camshaft design

d. The frequency of the Hall-effect or magnetic pulse

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Correct Answers:

1. a

2. c

3. b

4. c

5. d

6. a

7. d

8. a

9. b

10. c