

PRACTICE EXAM 2: T6 SIMULATION

(50 QUESTIONS)

1. A 24-volt circuit with a 6-ohm resistance draws how much current?

- A. 0.25 amps
- B. 2 amps
- C. 4 amps
- D. 144 amps

2. The maximum allowable parasitic draw on a heavy-duty truck with the ignition off is typically:

- A. 25 to 50 milliamps
- B. 100 to 200 milliamps
- C. 1 to 2 amps
- D. 5 to 10 amps

3. A circuit has 12.6 volts at the source and 12.4 volts at the load with the circuit energized. The voltage drop is:

- A. 12.4 volts
- B. 12.6 volts
- C. 25.0 volts
- D. 0.2 volts

4. Tech A says voltage drop on the ground side of a circuit should be measured separately from the power side. Tech B says total circuit voltage drop is the sum of power-side and ground-side drops. Who is correct?

- A. Tech A only
- B. Both Tech A and Tech B
- C. Tech B only
- D. Neither Tech A nor Tech B

5. Two resistors in parallel with values of 6 ohms and 12 ohms have a total resistance of:

- A. 18 ohms
- B. 9 ohms
- C. 6 ohms
- D. 4 ohms

6. The maximum acceptable voltage drop across a single connection or splice is typically:

- A. 0.1 volts or less
- B. 0.5 volts or less
- C. 1.0 volts or less
- D. 2.0 volts or less

7. A heavy-duty truck circuit shows 0.0 volts at the load with the switch in the ON position. Battery voltage is normal at 12.6 volts. The most likely cause is:

- A. High resistance in the load device itself
- B. Excessive current draw from the load
- C. Open circuit between the battery and the load

D. Short to ground at the load device

8. Tech A says the maximum voltage drop across a high-current battery cable should not exceed 0.2 volts. Tech B says voltage drop testing requires a load current at or near the cable's rated operating current. Who is correct?

A. Tech A only

B. Both Tech A and Tech B

C. Tech B only

D. Neither Tech A nor Tech B

9. Which of the following will NOT cause excessive voltage drop in a heavy-duty truck circuit?

A. Corroded terminal connections

B. Loose ground strap fasteners

C. Damaged splice connections

D. Excessive ambient temperature change

10. A digital multimeter set to 200-ohm scale reads "OL" when measuring across a wire with both leads connected. The most likely indication is:

A. The wire has an open circuit (infinite resistance)

B. The wire has zero resistance (perfect continuity)

C. The wire has resistance below 0.1 ohms

D. The meter is set to the incorrect range for the test

11. The voltage drop across a properly functioning 12-volt heavy-duty starter cable during cranking should be less than:

- A. 0.1 volts
- B. 0.5 volts
- C. 1.5 volts
- D. 3.0 volts

12. A series circuit contains a 12-volt source, a 4-ohm resistor, and a 2-ohm resistor. The voltage drop across the 4-ohm resistor is:

- A. 2 volts
- B. 4 volts
- C. 6 volts
- D. 8 volts

13. Tech A says a short to ground produces excessive current flow that blows the circuit fuse. Tech B says a high-resistance fault produces reduced current flow that does not blow the circuit fuse. Who is correct?

- A. Both Tech A and Tech B
- B. Tech A only
- C. Tech B only
- D. Neither Tech A nor Tech B

14. The proper digital multimeter setting for measuring continuity on a disconnected fuse is:

- A. AC voltage scale at 200 volts
- B. DC current scale at 10 amps

- C. Ohms or continuity mode
- D. Frequency mode at 1 kHz

15. A flooded lead-acid battery at 100 percent state of charge shows an open-circuit voltage of:

- A. 12.6 volts or higher
- B. 12.4 volts to 12.6 volts
- C. 12.2 volts to 12.4 volts
- D. 12.0 volts to 12.2 volts

16. The minimum acceptable voltage during a load test for a fully charged flooded lead-acid battery at 70°F is:

- A. 8.4 volts at the end of the test
- B. 9.0 volts at the end of the test
- C. 9.4 volts at the end of the test
- D. 9.6 volts at the end of the test

17. Tech A says the specific gravity of a fully charged flooded lead-acid battery is approximately 1.265. Tech B says specific gravity readings must be temperature-corrected for accurate state-of-charge determination. Who is correct?

- A. Tech A only
- B. Both Tech A and Tech B
- C. Tech B only
- D. Neither Tech A nor Tech B

18. A heavy-duty truck has four batteries connected in parallel, each rated at 950 CCA. The total CCA rating of the bank is:

- A. 950 CCA
- B. 1,900 CCA
- C. 2,850 CCA
- D. 3,800 CCA

19. The maximum acceptable voltage drop across a heavy-duty starter solenoid during cranking is typically:

- A. 0.05 volts
- B. 0.1 volts
- C. 0.3 volts
- D. 1.0 volts

20. A starter motor cranking current draw of 600 amps on a Class 8 truck is:

- A. Below the typical specification range
- B. Within the typical specification range
- C. Above the typical specification range
- D. Indicating immediate starter replacement need

21. Tech A says that battery cable connections should be torqued to the OEM specification, typically 70 to 100 inch-pounds for terminal post connections. Tech B says that overtightening battery terminals can crack the post or strip the lead casting. Who is correct?

- A. Tech A only

- B. Tech B only
- C. Neither Tech A nor Tech B
- D. Both Tech A and Tech B

22. The minimum voltage at the starter motor input during cranking should be:

- A. 9.6 volts at 70°F
- B. 11.0 volts at 70°F
- C. 12.0 volts at 70°F
- D. 12.6 volts at 70°F

23. The voltage regulation range for a typical 12-volt heavy-duty truck alternator is:

- A. 12.6 to 13.4 volts
- B. 13.0 to 13.6 volts
- C. 13.8 to 14.5 volts
- D. 14.5 to 15.5 volts

24. Tech A says alternator output current is rated at the maximum amperage the alternator can produce continuously. Tech B says actual alternator output is determined by load demand, not the rated maximum. Who is correct?

- A. Tech A only
- B. Both Tech A and Tech B
- C. Tech B only
- D. Neither Tech A nor Tech B

25. The maximum AC ripple voltage from a properly functioning heavy-duty alternator is:

- A. 0.05 volts AC
- B. 0.10 volts AC
- C. 0.25 volts AC
- D. 0.50 volts AC

26. A heavy-duty alternator full-load output test shows 165 amps. The alternator is rated at 200 amps. The conclusion is:

- A. The alternator output is below specification and requires service
- B. The alternator output is within specification and is functioning correctly
- C. The alternator output exceeds specification and requires regulator service
- D. The alternator output cannot be evaluated without additional testing

27. The recommended belt deflection for a heavy-duty alternator drive belt is typically:

- A. Approximately 1/4 inch with 25 lb-ft of force applied
- B. Approximately 3/8 inch with 25 lb-ft of force applied
- C. Per OEM specification using a tension gauge
- D. Approximately 1/2 inch with manual hand pressure applied

28. The standard headlight beam aim specification at 25 feet on a heavy-duty truck is typically:

- A. Beam centers level with the headlight height
- B. Beam centers approximately 2 inches below headlight height
- C. Beam centers approximately 6 inches above headlight height

D. Beam centers approximately 12 inches below headlight height

29. Tech A says LED tail lamps draw less current than incandescent bulbs of the same brightness. Tech B says LED retrofit installations may require load resistors to maintain proper flasher operation. Who is correct?

A. Both Tech A and Tech B

B. Tech A only

C. Tech B only

D. Neither Tech A nor Tech B

30. The maximum acceptable voltage drop across a heavy-duty truck headlight circuit is:

A. 0.05 volts

B. 0.10 volts

C. 0.25 volts

D. 0.50 volts

31. Tech A says that DOT-compliant heavy-duty truck stop lamps must illuminate when the brake pedal is depressed. Tech B says that DOT regulations require stop lamps to remain illuminated during ABS activation. Who is correct?

A. Tech A only

B. Tech B only

C. Both Tech A and Tech B

D. Neither Tech A nor Tech B

32. The current draw of a typical incandescent heavy-duty truck headlight bulb (high beam) is approximately:

- A. 0.5 amps at 12 volts
- B. 5 amps at 12 volts
- C. 15 amps at 12 volts
- D. 30 amps at 12 volts

33. A heavy-duty truck trailer connector (seven-way) provides which combination of circuits?

- A. Power, ground, stop, turn, marker, auxiliary, and ABS
- B. Power, ground, stop, and turn only
- C. Power, ground, stop, turn, marker, and ABS only
- D. Power, ground, stop, turn, marker, auxiliary, ABS, and trailer brakes

34. Which of the following will LEAST likely cause dim headlights on a heavy-duty truck?

- A. High resistance in the headlight power feed
- B. Open ground at the headlight assembly
- C. Discharged battery with low voltage at the source
- D. High resistance in the headlight ground circuit

35. The J1939 data bus operating speed is:

- A. 100 kbps
- B. 250 kbps
- C. 500 kbps

D. 1 Mbps

36. Tech A says CAN-H idles at approximately 2.5 volts and drives to 3.5 volts when transmitting. Tech B says CAN-L idles at 2.5 volts and drives to 1.5 volts when transmitting. Who is correct?

A. Tech A only

B. Tech B only

C. Both Tech A and Tech B

D. Neither Tech A nor Tech B

37. The resistance measured between CAN-H and CAN-L on a properly functioning J1939 bus with the system de-energized is approximately:

A. 60 ohms

B. 120 ohms

C. 240 ohms

D. 12,000 ohms

38. A failed terminating resistor on a J1939 bus would produce a measurement between CAN-H and CAN-L of approximately:

A. 0 ohms

B. 60 ohms

C. 240 ohms

D. 120 ohms

39. The voltage value typically used by heavy-duty truck temperature senders to communicate signal information is:

- A. 0 to 1 volts
- B. 0 to 3 volts
- C. 0 to 5 volts
- D. 0 to 12 volts

40. Tech A says PWM (pulse-width modulated) signals communicate sensor data through the duty cycle of the signal. Tech B says PWM signals are commonly used in modern heavy-duty trucks for sensor and actuator control. Who is correct?

- A. Tech A only
- B. Both Tech A and Tech B
- C. Tech B only
- D. Neither Tech A nor Tech B

41. The typical battery backup time for a heavy-duty truck instrument cluster after main battery disconnect is:

- A. A few seconds to retain settings
- B. Approximately 30 minutes
- C. Approximately 24 hours
- D. Greater than 7 days

42. A heavy-duty truck driver complains of intermittent gauge erratic behavior. The most likely first diagnostic step is:

- A. Replace the instrument cluster as the most common failure

- B. Reflash the engine ECU to restore communication
- C. Replace each affected sensor in sequence until resolved
- D. Verify power and ground integrity at the cluster connectors

43. Tech A says that warning lamp illumination is controlled by the body controller in modern heavy-duty trucks. Tech B says warning lamp logic depends on data bus messages from various modules including engine, transmission, and ABS. Who is correct?

- A. Neither Tech A nor Tech B
- B. Tech A only
- C. Both Tech A and Tech B
- D. Tech B only

44. A heavy-duty truck low-coolant warning lamp activates intermittently with verified normal coolant level. The most likely cause is:

- A. Failed coolant level sensor with intermittent open
- B. Failed coolant level sensor with shorted internal element
- C. Coolant level actually low despite the visual check
- D. Failed body controller activating the lamp without input

45. The proper diagnostic procedure for a "no communication" fault on a heavy-duty truck is to first:

- A. Verify scan tool connection and bus voltage at the diagnostic connector
- B. Replace the affected module reporting the fault on the network
- C. Disconnect the battery to reset the system communication
- D. Reflash the engine ECU to restore network communication

46. The maximum acceptable voltage difference between CAN-H and CAN-L during data transmission is approximately:

- A. 0.5 volts
- B. 1.0 volts
- C. 1.5 volts
- D. 2.0 volts

47. Tech A says heavy-duty truck telematics modules typically connect to the J1939 bus through a gateway. Tech B says telematics data transmission requires a continuous cellular signal during operation. Who is correct?

- A. Both Tech A and Tech B
- B. Tech A only
- C. Tech B only
- D. Neither Tech A nor Tech B

48. The recommended interval for heavy-duty truck instrument cluster diagnostic check is:

- A. Only when a driver complaint is reported
- B. Only at PM intervals greater than 100,000 miles
- C. At every PM interval as part of routine service
- D. Only at scheduled overhaul or major service events

49. A heavy-duty truck speedometer reads consistently 5 mph lower than actual speed. The most likely cause is:

- A. Incorrect speed sensor calibration data in the cluster
- B. Failed speed sensor producing intermittent output signal
- C. Damaged wiring between the sensor and the cluster
- D. Failed cluster requiring complete replacement service

50. The proper procedure for clearing fault codes on a heavy-duty truck after repair is:

- A. Disconnect the battery for 30 seconds to reset the ECU
- B. Cycle the ignition off and on several times to reset the codes
- C. Drive the truck through a normal duty cycle to clear codes
- D. Use a scan tool to clear codes from the affected modules

PRACTICE EXAM 2: ANSWER KEY AND EXPLANATIONS

1. C — 4 amps by Ohm's Law ($I = V \div R$). With 24 volts across 6 ohms: $24 \div 6 = 4$ amps. Heavy-duty trucks with 24-volt starting systems use the same Ohm's Law principles as 12-volt circuits, only with doubled voltage values.
2. A — 25 to 50 milliamps. Modern heavy-duty trucks with multiplexed modules typically draw 25 to 50 milliamps in sleep mode for module memory retention. Draw above this range indicates a circuit or module not entering sleep, requiring isolation diagnosis.
3. D — 0.2 volts. Voltage drop equals source voltage minus load voltage: $12.6 - 12.4 = 0.2$ volts. This drop is well within typical specifications and indicates a healthy circuit with low resistance.
4. B — Both Tech A and Tech B. Voltage drop must be measured separately on the power side and ground side of a circuit because each can develop independent high-resistance faults. Total circuit voltage drop equals the sum of both sides, and either side alone can produce loss of load voltage.
5. D — 4 ohms. Parallel resistance is calculated as the product divided by the sum: $(6 \times 12) \div (6 + 12) = 72 \div 18 = 4$ ohms. Parallel resistance is always less than the smallest individual resistor in the network.
6. A — 0.1 volts or less. Industry specifications limit single connection or splice voltage drop to 0.1 volts or less to prevent cumulative voltage loss across multi-connection circuits. Drops above this threshold indicate corrosion or loose connections requiring service.
7. C — Open circuit between the battery and the load. Zero volts at the load with normal source voltage indicates an open circuit somewhere between the battery and the load, preventing voltage from reaching the load. High resistance produces reduced voltage, not zero, and shorts produce blown fuses.
8. B — Both Tech A and Tech B. High-current battery cable voltage drop should not exceed 0.2 volts under load, and meaningful voltage drop testing requires the cable to carry rated operating current to expose resistance faults. Both specifications are part of proper diagnostic practice.
9. D — Excessive ambient temperature change. Temperature changes affect conductor resistance slightly but do not produce excessive voltage drop in normal operating ranges. Corroded terminals, loose grounds, and damaged splices all directly increase circuit resistance and produce excessive voltage drop.

10. A — The wire has an open circuit (infinite resistance). An "OL" (over-limit) reading on a resistance scale indicates resistance exceeds the meter's maximum reading, which on a continuity test of a wire indicates an open circuit. A good wire would read near zero ohms.
11. B — 0.5 volts. The maximum acceptable voltage drop across a 12-volt heavy-duty starter cable during cranking is 0.5 volts. Drops exceeding this threshold indicate cable, terminal, or connection issues that reduce cranking voltage at the starter.
12. D — 8 volts. In a series circuit, voltage divides across resistors in proportion to their resistance. Total resistance is 6 ohms, current is $12 \div 6 = 2$ amps, and voltage across the 4-ohm resistor is $2 \times 4 = 8$ volts.
13. A — Both Tech A and Tech B. A short to ground creates a low-resistance path that produces excessive current and blows the protective fuse, while a high-resistance fault reduces current below the fuse rating and does not blow the fuse. Both characterizations correctly describe the respective fault types.
14. C — Ohms or continuity mode. Fuse continuity testing requires the meter to source its own test current and measure resistance, which is what ohms or continuity mode does. A good fuse reads near zero ohms; a blown fuse reads infinite resistance (OL).
15. A — 12.6 volts or higher. A flooded lead-acid battery at 100 percent state of charge measures 12.6 volts or higher at open circuit. Lower voltages indicate decreasing state of charge per the standard voltage-to-SOC table.
16. D — 9.6 volts at the end of the test. Industry standard load testing of a fully charged flooded lead-acid battery at 70°F requires the battery to maintain at least 9.6 volts at the end of the 15-second test. Lower readings indicate the battery has lost capacity and requires replacement.
17. B — Both Tech A and Tech B. Specific gravity of a fully charged flooded lead-acid battery is approximately 1.265 at 80°F. Readings must be temperature-corrected because electrolyte density changes with temperature, and uncorrected readings produce inaccurate state-of-charge determination.
18. D — 3,800 CCA. Batteries connected in parallel add their CCA ratings while maintaining the same voltage: $4 \times 950 = 3,800$ CCA. This configuration is standard on heavy-duty trucks to deliver high cranking current at 12 volts.
19. C — 0.3 volts. The maximum acceptable voltage drop across a heavy-duty starter solenoid during cranking is typically 0.3 volts, with higher drops indicating contact wear or high-resistance connections. This specification ensures adequate voltage reaches the starter motor.
20. B — Within the typical specification range. A Class 8 truck starter typically draws 500 to 800 amps during cranking, so 600 amps is within the typical specification range. Draw above this range indicates starter or engine issues; draw below indicates battery or cable issues.

21. D — Both Tech A and Tech B. Battery cable connections should be torqued to OEM specification, typically 70 to 100 inch-pounds for terminal post connections. Overtorquing can crack the post or strip the lead casting, so torque-wrench application to specification is essential.
22. A — 9.6 volts at 70°F. The minimum voltage at the starter motor input during cranking should be 9.6 volts at 70°F to ensure adequate cranking torque. Voltage below this threshold produces slow cranking and starter damage from extended cranking.
23. C — 13.8 to 14.5 volts. Typical 12-volt heavy-duty truck alternator regulation falls in the 13.8 to 14.5 volt range, providing adequate voltage to charge batteries while preventing overcharge. Values outside this range indicate regulator or alternator faults.
24. B — Both Tech A and Tech B. Alternator rated output is the maximum continuous current the unit can produce, while actual output is determined by load demand on the system. Both characterizations correctly describe alternator operation.
25. D — 0.50 volts AC. The maximum AC ripple from a properly functioning heavy-duty alternator is 0.5 volts AC, with higher ripple indicating diode failure within the rectifier bridge. Excessive ripple damages electronics and disrupts data bus operation.
26. A — The alternator output is below specification and requires service. An output of 165 amps from a 200-amp rated alternator is 17.5 percent below specification, which exceeds typical tolerance and indicates alternator service is required. Diode, stator, or regulator issues are the typical causes.
27. C — Per OEM specification using a tension gauge. Heavy-duty alternator drive belt tension is set per OEM specification using a calibrated tension gauge, which provides accurate and repeatable tension settings. Deflection methods and hand-pressure techniques are not adequate for heavy-duty applications.
28. B — Beam centers approximately 2 inches below headlight height. The standard heavy-duty truck headlight aim specification at 25 feet places beam centers approximately 2 inches below headlight height, providing proper road illumination without blinding oncoming drivers. OEM specifications may vary slightly.
29. A — Both Tech A and Tech B. LED tail lamps draw significantly less current than incandescent bulbs of equivalent brightness due to higher electrical efficiency. LED retrofit installations frequently require load resistors because flashers depend on bulb current draw to time correctly, and reduced LED current causes hyper-flashing.
30. D — 0.50 volts. The maximum acceptable voltage drop across a heavy-duty truck headlight circuit is 0.5 volts, ensuring adequate voltage reaches the bulb for full brightness. Higher drops cause dim headlights and reduced lamp life.

31. C — Both Tech A and Tech B. DOT regulations require stop lamps to illuminate when the brake pedal is depressed and to remain illuminated during ABS activation. Both functions are part of the safety design that ensures following drivers receive proper braking signal in all conditions.
32. B — 5 amps at 12 volts. A typical 65-watt incandescent heavy-duty headlight bulb (high beam) draws approximately 5.4 amps at 12 volts ($P \div V = 65 \div 12$). This current draw determines fuse sizing and wiring requirements for the headlight circuit.
33. A — Power, ground, stop, turn, marker, auxiliary, and ABS. The standard SAE J560 seven-way trailer connector provides power, ground, stop, turn, marker, auxiliary (typically reverse or interior light), and ABS communication. Trailer brakes are controlled separately through the air brake system, not the seven-way connector.
34. D — High resistance in the headlight ground circuit.
35. B — 250 kbps. J1939 data bus operates at 250 kbps on most heavy-duty trucks, providing the bandwidth needed for engine, transmission, ABS, and body control communication across the network.
36. C — Both Tech A and Tech B. CAN-H idles at approximately 2.5 volts and drives to 3.5 volts during dominant transmission, while CAN-L idles at 2.5 volts and drives to 1.5 volts. The 2-volt differential signal between the wires is what carries data, providing noise immunity through differential signaling.
37. A — 60 ohms. A properly functioning J1939 bus measures 60 ohms between CAN-H and CAN-L with the system de-energized, because the two 120-ohm terminating resistors are connected in parallel ($120 \div 2 = 60$). This is the standard reading at the diagnostic connector.
38. D — 120 ohms. A failed (open) terminating resistor on a J1939 bus produces a measurement of 120 ohms between CAN-H and CAN-L because only one of the two parallel resistors remains in circuit. This measurement is a key diagnostic indicator of terminating resistor failure.
39. C — 0 to 5 volts. Heavy-duty truck temperature senders typically operate on a 0 to 5 volt reference signal, with the sender voltage varying with temperature to produce a readable signal range. This is the standard for analog sensors interfacing with module inputs.
40. B — Both Tech A and Tech B. PWM signals communicate sensor and actuator data through the duty cycle (percentage of on-time per cycle) of a fixed-frequency square wave. PWM is commonly used in modern heavy-duty trucks for sensor inputs (TPS, MAP) and actuator control (fans, fuel pumps).
41. A — A few seconds to retain settings. Heavy-duty truck instrument clusters typically retain settings for only a few seconds during main battery disconnect, after which trip data and short-term settings may be lost. Permanent settings (mileage, configuration) are stored in non-volatile memory and survive disconnect.

42. D — Verify power and ground integrity at the cluster connectors. Erratic gauge behavior on multiplexed clusters most commonly traces to power or ground supply faults, since the cluster depends on stable supply voltage to interpret network data correctly. Power and ground verification is faster and cheaper than cluster or sensor replacement.
43. C — Both Tech A and Tech B. Warning lamp illumination is controlled by the body controller in modern heavy-duty trucks, with warning lamp logic determined by data bus messages from engine, transmission, ABS, and other modules. Both technicians correctly describe parts of the warning lamp logic chain.
44. B — Failed coolant level sensor with shorted internal element. Intermittent activation with verified normal coolant level indicates the sensor is providing false low-level signals, typically from a shorted or intermittent internal element that simulates low coolant. Sensor replacement resolves this fault pattern.
45. A — Verify scan tool connection and bus voltage at the diagnostic connector. The first step for "no communication" diagnosis is to verify the scan tool connection and bus voltage at the diagnostic connector, ruling out tool or connector issues before pursuing network diagnosis. This step is fast, cheap, and frequently identifies the issue.
46. D — 2.0 volts. The voltage difference between CAN-H and CAN-L during dominant transmission is approximately 2.0 volts (CAN-H at 3.5V, CAN-L at 1.5V). Differential voltages outside this range indicate bus faults requiring diagnosis.
47. B — Tech A only. Heavy-duty truck telematics modules typically connect to the J1939 bus through a gateway module that translates and filters bus messages. Tech B is incorrect because telematics modules typically buffer data locally and transmit when cellular signal is available, not requiring continuous signal during operation.
48. C — At every PM interval as part of routine service. Heavy-duty truck instrument cluster diagnostic check is recommended at every PM interval to identify developing fault codes and verify proper module operation. Complaint-driven diagnosis alone misses developing issues that PM-interval checks catch early.
49. A — Incorrect speed sensor calibration data in the cluster. A consistent offset between displayed and actual speed indicates a calibration data issue in the cluster, where tire size, axle ratio, or transmission output ratio configuration does not match actual vehicle setup. Recalibration corrects this fault without replacing components.
50. D — Use a scan tool to clear codes from the affected modules. Proper code clearing requires a scan tool to send the clear command to the specific modules reporting the codes. Battery disconnect, ignition cycling, and drive cycles do not reliably clear codes from modern multiplexed modules and may not address all stored codes.