PRACTICE EXAM 10: A9 LIGHT VEHICLE DIESEL ENGINES SIMULATION (60 QUESTIONS)

1. A common-rail diesel can deliver several injection events per combustion cycle. The benefit of this capability is improved:

A. control of noise, emissions, and combustion quality

B. separation of water from the fuel supply

C. cooling of the exhaust after-treatment system

D. charging of the vehicle's batteries at idle

2. A diesel's exhaust smoke is persistently white after warm-up, with coolant loss. This points to:

A. worn rings burning oil in the cylinders

B. an engine air filter restriction

C. coolant entering the combustion chamber

D. a normal cold-start condition

3. The cetane number of diesel fuel describes its:

A. resistance to autoignition

B. energy content per gallon

C. readiness to autoignite

D. sulfur concentration

4. A diesel cylinder-head deck is checked with a straightedge and feeler gauge. This check measures:

A. valve-guide-to-stem clearance

B. head warpage (flatness)

C. camshaft lobe lift

D. valve-spring tension

5. A wastegate on a fixed-geometry turbocharger limits maximum boost by:

A. cooling the compressed intake air

B. recirculating exhaust to the intake

C. filtering the incoming air charge

D. bypassing exhaust around the turbine

6. A diesel's piston oil-cooling jets are inspected during a rebuild. A blocked jet will MOST likely cause:

A. piston overheating and scuffing

B. a no-crank starting condition

C. high common-rail fuel pressure

D. overcharged starting batteries

7. A diesel injector leak-off test shows one cylinder returning far more fuel than the others. This identifies:

A. a new injector within specification

B. a worn injector leaking off excessively

C. a contaminated mass airflow sensor

D. a stuck-open cooling thermostat

8. A valve seat is reground. To seal and shed heat, it must be concentric with the guide and have the correct:

A. spring installed height

B. camshaft lobe lift

C. width and angle

D. cylinder-bore surface finish

9. A diesel particulate filter accumulates a substance that regeneration cannot remove. That substance is:

A. soot burned during regeneration

B. unburned fuel from post-injection

C. condensed water vapor

D. ash from oil additives

10. A diesel's low-pressure supply to the high-pressure pump tests below specification. The MOST likely consequence is:

A. overcharged starting batteries

B. inability to build proper rail pressure

C. excessively low coolant temperature

D. a stuck-open exhaust gas recirculation valve

11. A main bearing shows a smeared, heat-discolored surface. This indicates:

A. loss of lubrication or excessive clearance

B. abrasive dirt contamination in the oil

C. normal, light wear nearing end of life

D. correct clearance and an adequate oil film

12. A diagnostic trouble code names a circuit. The MOST professional next step is to:

A. replace the named part at once

B. clear the code and release the vehicle

C. disconnect the battery to relearn

D. test the circuit and component before replacing

13. In a common-rail system, the rail-pressure sensor allows the ECM to:

A. measure the returning fuel temperature

B. count the injection events per cycle

C. control rail pressure in closed loop

D. detect water in the separator bowl

14. Oil pooled inside the charge-air cooler MOST likely indicates:

A. a clogged engine air filter

B. leaking turbocharger compressor-side seals

C. a stuck-closed exhaust gas recirculation valve

D. a thermostat that is stuck open

15. To distinguish an engine vibration from a driveline vibration, the technician notes that an engine vibration changes with:

A. engine speed, not road speed

B. road speed, not engine speed

C. ambient temperature only

D. neither engine nor road speed

16. A diesel runs cold, makes white smoke, returns poor economy, and cannot regenerate. The MOST likely cause is a:

A. thermostat stuck in the open position

B. leaking water-pump shaft seal

C. radiator clogged externally with debris

D. head gasket leaking combustion gas

17. A diesel cranks but won't start, with good compression and supply and no rail-pressure buildup; the metering valve responds. Next, check the injectors and pressure-control valve for:

A. correct calibration codes only

B. proper spray pattern at idle

C. electrical resistance only

D. excessive leak-off bleeding the rail

18. Head bolts that are torque-to-yield should be:

A. always reused after cleaning the threads

B. tightened to a single low value only

C. replaced when the manufacturer specifies

D. left finger-tight, then run down quickly

19. A diesel fuel/water separator removes water primarily to:

A. raise the fuel's cetane number

B. protect high-pressure components from corrosion

C. cool the fuel returning to the tank

D. trap ash before the fuel filter

20. Selective catalytic reduction (SCR) converts NOx into:

A. carbon monoxide and hydrocarbons

B. soot trapped by the filter

C. sulfur dioxide and carbon dioxide

D. nitrogen and water vapor

21. Cylinder bore out-of-round is found by measuring the bore:

A. only at the very bottom

B. between two adjacent cylinders

C. parallel and perpendicular to the crank at one depth

D. at the crankshaft main journal

22. Ultra-low-sulfur diesel's reduced lubricity is compensated by:

A. adding lubricity additives to the fuel

B. raising the sulfur content again

C. lowering the fuel's cetane number

D. removing water-separation requirements

23. A diesel oxidation catalyst (DOC) supports regeneration by:

A. trapping the soot particles physically

B. oxidizing hydrocarbons to generate heat

C. dosing diesel exhaust fluid into the stream

D. recirculating exhaust to the intake

24. Freeze-frame data stored with a trouble code is valuable because it records:

A. the labor time required for the repair

B. exactly which part has failed

C. the dollar cost of the repair

D. the operating conditions when the fault set

25. A diesel runs poorly only in severe cold with the filter waxed. The fuel has exceeded its:

A. maximum cetane rating

B. energy content limit

C. cold filter plugging point

D. sulfur concentration cap

26. A diesel's oil pressure is low at idle. The technician should FIRST verify:

A. the camshaft lobe lift

B. the oil level, condition, and viscosity

C. the charge-air cooler for leaks

D. the rail-pressure sensor signal

27. A diesel uses an oil-to-coolant oil cooler. An internal leak in it will MOST likely produce:

A. cross-contamination of the oil and coolant

B. a no-crank starting condition

C. high common-rail fuel pressure

D. a plugged diesel particulate filter

28. A plugged diesel particulate filter raises exhaust back-pressure, which affects the turbocharger by:

A. raising the low-pressure fuel supply

B. overcooling the intake air charge

C. increasing the alternator output

D. starving the turbine of flow needed for boost

29. A connecting rod that is bent will MOST likely cause:

A. excessive crankshaft end-play

B. a stuck variable-geometry turbocharger

C. uneven bearing and cylinder wear on that cylinder

D. low common-rail pressure

30. After replacing a common-rail injector, the engine runs rough with a balance code though the injector tests good. The technician overlooked:

A. flushing the engine coolant

B. programming the injector's calibration code

C. replacing the low-pressure lift pump

D. testing the alternator output

31. Black smoke with low boost and high exhaust temperature should prompt the technician to check the:

A. battery and cable connections

B. cabin HVAC blower system

C. windshield washer system

D. exhaust for a restriction such as a plugged DPF

32. A HEUI injection system actuates injection using:

A. high-pressure engine oil controlled by the IPR valve

B. fuel from a shared common rail

C. a camshaft lobe at each injector

D. compressed intake air

33. A worn camshaft lobe reduces valve lift. Before fitting a new cam, the technician should:

A. raise the valve lash beyond specification

B. install a thicker head gasket

C. find and correct the cause, such as poor lubrication

D. raise the oil pressure relief setting

34. A suction-side air leak in the low-pressure fuel circuit will MOST likely cause:

A. high rail pressure during cranking

B. hard starting, stalling, and rough running

C. overcharged starting batteries

D. a stuck variable-geometry turbocharger

35. A variable-geometry turbocharger can raise exhaust back-pressure and temperature on command to support:

A. particulate-filter regeneration and exhaust braking

B. low-pressure fuel delivery to the lift pump

C. cold-cranking of the high-compression engine

D. battery charging at idle

36. A diesel loses power under load only, with rail pressure dropping below command at high flow. The MOST likely faulty part is the:

A. intake air temperature sensor

B. exhaust back-pressure sensor

C. low-pressure return fuel cooler

D. high-pressure fuel pump

37. A noise occurring at one-half crankshaft speed on a four-stroke diesel points to the:

A. connecting-rod bearings

B. valve-train components

C. crankshaft main bearings

D. turbocharger center bearings

38. Electronic unit injectors (EUI) generate high pressure by being driven:

A. from a shared common rail

B. by high-pressure engine oil

C. mechanically, usually by a camshaft lobe

D. by the low-pressure lift pump alone

39. Connecting-rod side clearance is checked with a:

A. feeler gauge between the rod and crank cheek

B. micrometer on the rod journal

C. bore gauge in the rod big end

D. dial indicator on the piston crown

40. A diesel fuel cooler on the return line is used to:

A. raise the fuel's cetane number

B. add lubricity additives to the fuel

C. separate water from the returning fuel

D. shed heat from fuel returning hot from the high-pressure system

41. A water pump's weep hole leaks coolant on an overheating diesel. This indicates a:

A. thermostat stuck in the closed position

B. cracked radiator end tank

C. failed water-pump shaft seal

D. leaking EGR cooler core

42. On a diesel, the mass airflow (MAF) sensor is used heavily to control:

A. the coolant temperature target

B. EGR flow and smoke-limited fueling

C. the alternator's voltage output

D. the starter's cranking current

43. A diesel particulate filter accumulates ash. To slow this buildup, the engine should use:

A. a higher-cetane diesel fuel

B. a thicker engine oil viscosity

C. a richer fuel-control calibration

D. the specified low-SAPS engine oil

44. A valve face can be reground only if the valve retains:

A. adequate margin after grinding

B. a bent stem that is within limits

C. a worn keeper groove at the tip

D. excessive guide clearance in the head

45. To separate an air-side from a fuel-side cause of black smoke and low boost, the technician compares:

A. coolant temperature to engine oil temperature

B. battery voltage to alternator output

C. actual boost to commanded (desired) boost

D. DEF level to the NOx sensor data

46. A water-in-fuel sensor warning means the technician should:

A. replace the high-pressure pump immediately

B. drain the water from the separator bowl

C. raise the commanded rail pressure

D. reprogram the fuel injectors

47. A diesel with SCR shows the downstream NOx sensor nearly equal to the upstream sensor. This indicates:

A. fully effective NOx reduction

B. an overfilled diesel exhaust fluid tank

C. excessive turbocharger boost pressure

D. poor NOx conversion from a dosing or catalyst fault

48. A pilot injection in a common-rail system is delivered before the main event to:

A. burn soot in the diesel particulate filter

B. cool the SCR catalyst before dosing

C. raise rail pressure quickly during cranking

D. soften the pressure rise and reduce combustion noise

49. During bottom-end reassembly, the crankshaft is rotated by hand after each torque stage to:

A. confirm the assembly turns freely with no binding

B. seat the piston rings against the bores

C. prime the high-pressure fuel pump

D. set the camshaft-to-crankshaft timing

50. Low-SAPS engine oil is required on after-treatment diesels mainly to:

A. raise the fuel's cetane number

B. increase the coolant's boiling point

C. protect the particulate filter and catalysts

D. eliminate the need for piston-cooling jets

51. A charge-air cooler (intercooler) increases power and lowers combustion temperature by:

A. raising exhaust temperature for regeneration

B. cooling the compressed intake air to increase density

C. filtering abrasive particles from the air

D. recirculating exhaust into the intake manifold

52. A diesel's low-pressure (lift) pump primarily serves to:

A. ensure the high-pressure pump has an adequate supply

B. atomize the fuel inside the cylinder

C. store high-pressure fuel for the injectors

D. cool the SCR catalyst during dosing

53. An EGR cooler develops an internal leak. Besides coolant loss, this can:

A. raise the fuel's cetane number

B. overcharge the starting batteries

C. permanently advance the injection timing

D. introduce coolant into the intake or exhaust stream

54. On an aluminum diesel cylinder head, aggressive abrasive cleaning tools should be avoided because they can:

A. raise the valve spring installed height

B. increase the camshaft lobe lift

C. remove metal and ruin the surface flatness

D. lower the fuel's cetane number

55. Biodiesel can plug a fuel filter shortly after first use because it:

A. raises the sulfur content of the fuel

B. has a solvent effect that loosens deposits

C. lowers injection pressure permanently

D. cannot pass through any standard filter

56. A vague "runs bad" complaint must be defined before testing by establishing:

A. when, what, and how often the symptom occurs

B. the labor time required for the repair

C. which parts to replace first

D. the vehicle's current resale value

57. A variable-geometry turbocharger gives low boost off idle, and the vanes are heavily sooted. The cause is MOST likely:

A. a cracked charge-air cooler core

B. a stuck-open cooling thermostat

C. a failed low-pressure lift pump

D. carbon binding the variable vanes

58. A diesel's high-pressure pump meets rail pressure at light load but falls short at high flow. This indicates:

A. the rail-pressure sensor is biased high

B. a worn pump that cannot supply enough volume

C. a stuck-open exhaust gas recirculation valve

D. a contaminated mass airflow sensor

59. A main bearing shows embedded grit and fine scratches across its face. This indicates:

A. oil starvation and film breakdown

B. fatigue from high combustion loads

C. abrasive dirt contamination in the oil

D. correct clearance and a strong oil film

60. Diesel fuel lubricity is important because the fuel must:

A. lubricate the high-pressure pump and injectors

B. cool the diesel particulate filter

C. supply ammonia to the SCR catalyst

D. raise the coolant's boiling point

PRACTICE EXAM 10– ANSWER KEY (Questions 1–60)

1. A — Common-rail systems can fire pilot, main, and post injections per cycle, improving control of combustion noise, emissions, and overall combustion quality. The rail's stored pressure enables this flexibility independent of engine speed. These multiple events are a defining advantage of common rail.

2. C — Persistent white smoke after warm-up with coolant loss indicates coolant entering the combustion chamber, typically through a head gasket, cracked head, or EGR cooler. White smoke is unburned fuel or coolant vapor. This pattern warrants a combustion-leak test.

3. C — Cetane number measures the fuel's readiness to autoignite; higher cetane shortens the ignition delay for smoother starting and combustion. It is the opposite of gasoline octane, which resists ignition. Cetane directly affects cold-start and noise behavior.

4. B — A straightedge and feeler gauge across the deck measure head warpage (flatness) by revealing any gap against the maximum specification. This determines whether the head can be reused or must be machined. It does not measure guide clearance or lobe lift.

5. D — A wastegate caps boost on a fixed-geometry turbo by bypassing some exhaust around the turbine so it cannot overspeed. This limits maximum boost pressure. It is an exhaust-side control, not an air-cooling or filtering device.

6. A — A blocked piston oil-cooling jet lets its piston overheat, causing localized overheating and scuffing. The jet carries combustion heat away from the piston underside. Inspecting and clearing the jets is a required diesel rebuild step.

7. B — A cylinder returning far more fuel than the others on a leak-off test has a worn injector leaking off excess fuel. The excess return isolates the failing unit. This test pinpoints the bad injector without disassembly.

8. C — A reconditioned valve seat must be concentric with the guide and have the correct width and angle so the valve seats squarely, seals, and sheds heat. Width and angle set the contact band. Incorrect width or angle prevents sealing and heat transfer.

9. D — Ash, largely from oil additives, accumulates in the particulate filter and cannot be burned off by regeneration, unlike soot. Over time ash fills the filter and requires cleaning or replacement. Low-SAPS oil slows this accumulation.

10. B — Low low-pressure supply starves the high-pressure pump, so it cannot build proper rail pressure, causing hard starting, low power, or a no-start. The pump can only pressurize what it is fed. This is why supply pressure is checked before suspecting high-pressure parts.

11. A — A smeared, heat-discolored bearing indicates the oil film broke down from lost lubrication or excessive clearance. Dirt contamination instead leaves embedded grit. Reading the pattern identifies the root cause.

12. D — A trouble code names a circuit, not a failed part, so the professional step is to test the circuit and component before replacing anything. Wiring, connectors, and the monitored system can set the code. Testing first prevents replacing good parts.

13. C — The rail-pressure sensor lets the ECM control rail pressure in closed loop, adjusting the metering and pressure-control valves to hold the commanded pressure. Comparing commanded to actual pressure is central to high-pressure diagnosis. The sensor enables precise control.

14. B — Oil pooled in the charge-air cooler comes from leaking turbocharger compressor-side seals upstream pushing oil into the intake. It signals a failing turbo, often with blue smoke. Finding oil in the CAC directs diagnosis to the turbocharger.

15. A — An engine-related vibration changes with engine speed but not road speed, while a driveline vibration tracks road speed. Correlating the vibration to engine versus road speed separates the two sources. This distinction directs the diagnosis to the right system.

16. A — An engine that runs cold with white smoke, poor economy, and failed regenerations points to a thermostat stuck open. The engine never reaching operating temperature is the defining clue. The other choices cause overheating or external leaks.

17. D — With good supply and a working metering valve, no rail-pressure buildup points to the injectors or pressure-control valve leaking off and bleeding the rail. The leak-off prevents the rail from charging. Leak-off testing isolates the offending component.

18. C — Torque-to-yield bolts are stretched into yield and are frequently single-use, so they should be replaced when the manufacturer specifies. Reusing them when replacement is required risks loss of clamping force. Checking the requirement prevents a gasket failure.

19. B — The fuel/water separator removes water primarily to protect the high-pressure components from corrosion and erosion. Water is diesel fuel's most damaging contaminant. Draining the collected water on schedule protects those parts.

20. D — Selective catalytic reduction uses ammonia from DEF to convert NOx into harmless nitrogen and water vapor. This is the primary NOx-control technology on modern light diesels. Proper DEF dosing and catalyst function are required for compliance.

21. C — Out-of-round is found by measuring the bore diameter both parallel and perpendicular to the crankshaft at the same depth and comparing the two. The difference is the out-of-round value. Detecting it determines whether the bore can be honed or must be machined.

22. A — Because ULSD's low sulfur reduces natural lubricity, refiners add lubricity additives to protect the high-pressure pump and injectors. Low-lubricity fuel accelerates wear of those parts. The additives preserve injection-system durability.

23. B — The diesel oxidation catalyst supports regeneration by oxidizing hydrocarbons to generate the heat used to burn soot in the filter. It also converts CO and HC. Its heat-generating role is essential to active regeneration.

24. D — Freeze-frame data records the operating conditions present at the instant the code set, helping the technician reproduce the fault. It is a diagnostic snapshot, not a repair, labor-time, or cost record. This makes it valuable for intermittent faults.

25. C — A waxed filter in severe cold means the fuel has exceeded its cold filter plugging point, where wax crystals plug the filter. This starves the engine and causes poor running. Winter fuel and a working fuel heater prevent it.

26. B — Before condemning the oil pump for low pressure, the technician checks oil level, condition, and viscosity, since low or wrong oil is a common, easily verified cause. These simple checks rule out the most frequent causes. Confirming them prevents replacing a good pump.

27. A — An internal leak in an oil-to-coolant oil cooler cross-contaminates the oil and coolant, producing milky oil or oil in the coolant. It does not cause a no-crank or rail-pressure fault. This finding points to the oil cooler or another internal crossover.

28. D — A plugged particulate filter raises back-pressure that starves the turbine of the flow it needs to spin the compressor, so boost falls. The exhaust restriction limits the turbo's drive energy. This is why a plugged DPF belongs on the low-boost differential.

29. C — A bent connecting rod misaligns the piston and journal, causing uneven bearing and cylinder-wall wear on that cylinder. The misalignment loads parts unevenly. Detecting it explains one-sided wear and prevents a repeat failure.

30. B — A new injector that runs rough and sets a balance code despite testing good was installed without programming its calibration code. The ECM cannot correct for the injector's variation without the code. Programming the code resolves the rough running.

31. D — Black smoke with low boost and high exhaust temperature points to an exhaust restriction such as a plugged DPF, which raises back-pressure and starves the turbine. Checking the exhaust completes the air-system picture. Overlooking it leads to misdiagnosing the turbo or fuel system.

32. A — A HEUI system actuates injection with high-pressure engine oil regulated by the injection pressure regulator (IPR) valve. Injection therefore depends on oil condition and the high-pressure oil system. This distinguishes HEUI from common-rail and unit-injector designs.

33. C — Worn camshaft lobes usually result from a lubrication problem, so the cause must be found and corrected before installing a new cam. Otherwise the replacement will wear the same way. Fixing the root cause protects the new part.

34. B — A suction-side air leak introduces air into the fuel, causing hard starting, stalling, and rough running that often come and go. It is a frequently overlooked low-pressure fault. Confirming an air-free supply prevents needless component replacement.

35. A — A variable-geometry turbo can close its vanes to raise exhaust back-pressure and temperature on command, which the engine uses for particulate-filter regeneration and exhaust braking. This dual capability is unique to VGTs. It links the air system to after-treatment function.

36. D — Power loss under load with rail pressure dropping below command at high flow points to a worn high-pressure fuel pump that cannot supply enough volume. At light load the pump keeps up. Comparing commanded and actual pressure across load isolates the fault.

37. B — A noise at one-half crankshaft speed points to the valve train, because the camshaft turns at half crank speed on a four-stroke engine. Rod and main noises track crankshaft speed instead. This timing clue localizes the source.

38. C — Electronic unit injectors generate their high pressure mechanically, with a camshaft lobe driving each injector under electronic control. They do not use a shared rail or high-pressure oil. Identifying this architecture shapes the diagnostic approach.

39. A — Connecting-rod side clearance is measured with a feeler gauge between the rod and the crankshaft cheek. A micrometer or bore gauge measures journal or bore dimensions instead. Correct side clearance ensures proper rod lubrication and movement.

40. D — A return-line fuel cooler sheds heat from fuel returning hot from the high-pressure system, protecting tank and pump components and maintaining fuel density. Excess fuel temperature can harm those parts. The cooler manages return-fuel heat.

41. C — Coolant weeping from the water-pump weep hole is the designed indication of a failed pump shaft seal allowing coolant past it. This confirms the pump as the leak source. Replacing the pump restores cooling-system integrity.

42. B — On a diesel the mass airflow sensor is used heavily to control EGR flow and to smoke-limit fueling based on actual air mass. A contaminated MAF disturbs both. It does not set coolant temperature, charging, or cranking current.

43. D — Ash that regeneration cannot remove comes largely from oil additives, so using the specified low-SAPS oil slows the ash buildup in the filter. Low-SAPS oil reduces the ash-forming content. This extends filter service life.

44. A — A valve face can be reground only if the valve retains adequate margin after grinding; a thin margin overheats and burns. Without enough margin the valve must be replaced. Checking margin determines whether the valve is serviceable.

45. C — To separate an air-side from a fuel-side cause of black smoke with low boost, the technician compares actual boost to commanded (desired) boost. A gap points to the air system; matching values shift suspicion to fueling. This comparison directs the diagnosis efficiently.

46. B — A water-in-fuel warning means the separator has collected water that must be drained before it reaches the injection system. Draining removes the damaging contaminant. Ignoring it allows water to corrode high-pressure components.

47. D — A downstream NOx sensor nearly equal to the upstream sensor shows little NOx is being converted, indicating a dosing or SCR catalyst fault. Effective reduction would show a much lower downstream value. Comparing the two sensors directly measures conversion efficiency.

48. D — The pilot injection introduces a small fuel quantity before the main event to soften the rapid pressure rise and reduce combustion noise. Common-rail pressure control enables these multiple events. It is a noise- and emissions-control strategy.

49. A — Rotating the crankshaft by hand after each torque stage confirms the assembly turns freely with no binding, catching a misassembly before startup. A bind found by hand is far cheaper than one found running. This check is standard reassembly discipline.

50. C — Low-SAPS oil limits sulfated ash, phosphorus, and sulfur to protect the diesel particulate filter and catalysts from contamination and plugging. The correct oil preserves after-treatment life. The wrong oil accelerates ash loading and can damage the system.

51. B — A charge-air cooler increases power and lowers combustion temperature by cooling the compressed intake air to raise its density. Denser air carries more oxygen into the cylinder. It cools intake air rather than exhaust or recirculated gas.

52. A — The low-pressure lift pump ensures the high-pressure pump always has an adequate fuel supply so it can build rail pressure. The pump can only pressurize the fuel it receives. Inadequate supply causes hard starting, low power, or a no-start.

53. D — An internally leaking EGR cooler introduces coolant into the intake or exhaust stream in addition to losing coolant. This is a diesel-specific coolant-consumption path. Pressure-testing the cooler confirms the leak.

54. C — Aggressive abrasives on an aluminum head can remove metal and ruin the surface flatness required to seal, especially for MLS gaskets. Preserving flatness and finish protects the seal. Careful cleaning avoids ruining the head.

55. B — Biodiesel's solvent effect loosens existing deposits in the fuel system, and that debris plugs the filter shortly after first use. It does not raise sulfur or block all filtration. Anticipating early filter plugging is part of servicing biodiesel vehicles.

56. A — Defining a vague complaint means establishing when, what, and how often the symptom occurs so it can be reproduced and later confirmed as repaired. A reproducible fault is a diagnosable fault. Vague descriptions hide the actual problem.

57. D — Low boost off idle with heavily sooted vanes indicates carbon binding the variable vanes so they cannot close to build boost early. Sticking vanes are a common VGT problem. Cleaning or replacing the affected parts restores boost response.

58. B — A pump that meets pressure at light load but falls short at high flow demand is worn and cannot supply enough volume. The wear is masked at idle. Comparing commanded and actual pressure across load isolates the failing pump.

59. C — Embedded grit and fine scratches across the bearing face indicate abrasive dirt contamination carried in the oil. A wiped, heat-discolored surface instead means oil starvation. Reading the pattern identifies the root cause.

60. A — Diesel fuel must lubricate the precision high-pressure pump and injector components, which is why lubricity matters and is restored with additives in low-sulfur fuel. Low-lubricity fuel accelerates wear of those parts. Adequate lubricity protects injection-system durability.