ASE STUDENT CERTIFICATION
TEST SPECIFICATIONS AND TASK LISTS

AUTOMOBILE SERIES – 2017 NATEF STANDARDS

This document contains the task list and test specifications for both the ***Maintenance and Light Repair*** and ***Automobile Service Technology*** tests. Each test corresponds to the 2017 NATEF Automobile Standards for program accreditation.

The task lists are simply listings of the tasks involved in the process of diagnosing and repairing problems in the various vehicle systems. The tasks may also be thought of as competencies. Each question found in the tests is keyed to one of these tasks. The tasks are organized into content categories, and these content categories, along with the number of questions included in each category, comprise the test specifications. Every form of the exams will be built to meet these specifications.

Students preparing for the ASE Student Certification tests should review the entire tasks list and note areas where further preparation may be needed. It also helps students to consider how many questions will be included on the exams in each content area.

These tests may include additional questions for statistical evaluation. These extra questions will not count for or against the final score. Since the extra questions are not identified, test candidates should answer every question to the best of their ability.

Click on the test title to navigate to the corresponding page.

Maintenance and Light Repair

Content Area	Questions In Test
A. Engine Repair (ER)	6
B. Automatic Transmission And Transaxle (AT)	3
C. Manual Drive Train And Axles (MD)	3
D. Suspension and Steering (SS)	10
E. Brakes (BR)	11
F. Electrical/Electronic Systems (EE)	11
G. Heating and Air Conditioning (AC)	3
H. Engine Performance (EP)	6
I. Supplemental Tasks (GT)	7
Required To Pass: 31 of 60 **TOTAL**	60

Notes:
1. Effective August 1, 2017, this test is based on the ***Maintenance and Light Repair*** tasks of the 2017 NATEF MLR Automobile Program Standards and is intended for those students who have completed a course of study that corresponds with that level of instruction.

2. This test may include additional questions for statistical evaluation. These extra questions will not count for or against the final score. Since the extra questions are not identified, test candidates should answer every question to the best of their ability.

I. ENGINE REPAIR

ER-A. General

1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.
2. Verify operation of the instrument panel engine warning indicators.
3. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
4. Install engine covers using gaskets, seals, and sealers as required.
5. Verify engine mechanical timing.
6. Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.
7. Identify service precautions related to service of the internal combustion engine of a hybrid vehicle.

ER-B. Cylinder Head and Valve Train

1. Adjust valves (mechanical or hydraulic lifters).
2. Identify components of the cylinder head and valve train.

ER-C. Lubrication and Cooling Systems

1. Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core, and galley plugs; determine necessary action.
2. Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.
3. Remove, inspect, and replace thermostat and gasket/seal.
4. Inspect and test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required.
5. Perform engine oil and filter change; use proper fluid type per manufacturer specification; reset maintenance reminder as required.
6. Identify components of the lubrication and cooling systems.

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II. AUTOMATIC TRANSMISSION AND TRANSAXLE

AT-A. General

1. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins.
2. Check fluid level in a transmission or a transaxle equipped with a dip-stick.
3. Check fluid level in a transmission or a transaxle not equipped with a dip-stick.
4. Check transmission fluid condition; check for leaks.
5. Identify drive train components and configuration.

AT-B. In-Vehicle Transmission/Transaxle

1. Inspect, adjust, and/or replace external manual valve shift linkage, transmission range sensor/switch, and/or park/neutral position switch.
2. Inspect for leakage at external seals, gaskets, and bushings.
3. Inspect, replace and/or align power train mounts.
4. Drain and replace fluid and filter(s); use proper fluid type per manufacturer specification.

AT-C. Off-Vehicle Transmission and Transaxle

1. Describe the operational characteristics of a continuously variable transmission (CVT).
2. Describe the operational characteristics of a hybrid vehicle drive train.

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III. MANUAL DRIVE TRAIN AND AXLES

MD-A. General

1. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins.
2. Drain and refill manual transmission/transaxle and final drive unit; use proper fluid type per manufacturer specification.
3. Check fluid condition; check for leaks.
4. Identify manual drive train and axle components and configuration.

MD-B. Clutch

1. Check and adjust clutch master cylinder fluid level; use proper fluid type per manufacturer specification
2. Check for hydraulic system leaks.

MD-C. Transmission/Transaxle

1. Describe the operational characteristics of an electronically-controlled manual transmission/transaxle.

MD-D. Drive Shaft, Half Shafts, Universal Joints and Constant-Velocity (CV) Joints (Front, Rear, All, and Four-wheel drive)

1. Inspect, remove, and/or replace bearings, hubs, and seals.
2. Inspect, service, and/or replace shafts, yokes, boots, and universal/CV joints.
3. Inspect locking hubs.
4. Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification.

MD-E. Differential Case Assembly

1. Clean and inspect differential case; check for leaks; inspect housing vent.
2. Check and adjust differential case fluid level; use proper fluid type per manufacturer specification.
3. Drain and refill differential housing.
4. Inspect and replace drive axle wheel studs.

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IV. SUSPENSION AND STEERING SYSTEMS

SS-A. General

1. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins.
2. Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.
3. Identify suspension and steering system components and configurations.

SS-B. Related Suspension and Steering Service

1. Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.
2. Inspect power steering fluid level and condition.
3. Flush, fill, and bleed power steering system; use proper fluid type per manufacturer specification.
4. Inspect for power steering fluid leakage.
5. Remove, inspect, replace, and/or adjust power steering pump drive belt.
6. Inspect and replace power steering hoses and fittings.
7. Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm, mountings, and steering linkage damper.
8. Inspect tie rod ends (sockets), tie rod sleeves, and clamps.
9. Inspect upper and lower control arms, bushings, and shafts.
10. Inspect and replace rebound bumpers.
11. Inspect track bar, strut rods/radius arms, and related mounts and bushings.
12. Inspect upper and lower ball joints (with or without wear indicators).
13. Inspect suspension system coil springs and spring insulators (silencers).
14. Inspect suspension system torsion bars and mounts.
15. Inspect and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links.
16. Inspect, remove, and/or replace strut cartridge or assembly; inspect mounts and bushings.
17. Inspect front strut bearing and mount.
18. Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms.
19. Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts.
20. Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings.
21. Inspect electric power steering assist system.
22. Identify hybrid vehicle power steering system electrical circuits and safety precautions.
23. Describe the function of suspension and steering control systems and components, (i.e. active suspension, and stability control).

SS-C. Wheel Alignment

1. Perform prealignment inspection; measure vehicle ride height.
2. Describe alignment angles (camber, caster and toe)

SS-D. Wheels and Tires

1. Inspect tire condition; identify tire wear patterns; check for correct tire size, application (load and speed ratings), and air pressure as listed on the tire information placard/label.
2. Rotate tires according to manufacturer's recommendations including vehicles equipped with tire pressure monitoring systems (TPMS).
3. Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly.
4. Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.
5. Inspect tire and wheel assembly for air loss; determine necessary action.
6. Repair tire following vehicle manufacturer approved procedure.
7. Identify indirect and direct tire pressure monitoring systems (TPMS); calibrate system; verify operation of instrument panel lamps.
8. Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system (TPMS) including relearn procedure.

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V. BRAKES

BR-A. General

1. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins.
2. Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS).
3. Install wheel and torque lug nuts.
4. Identify brake system components and configuration.

BR-B. Hydraulic System

1. Describe proper brake pedal height, travel, and feel.
2. Check master cylinder for external leaks and proper operation.
3. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, and loose fittings/supports.
4. Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification.
5. Identify components of hydraulic brake warning light system.
6. Bleed and/or flush brake system.
7. Test brake fluid for contamination.

BR-C. Drum Brakes

1. Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability.
2. Refinish brake drum and measure final drum diameter; compare with specification.
3. Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.
4. Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.
5. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments.

BR-D. Disc Brakes

1. Remove and clean caliper assembly; inspect for leaks and damage/wear; determine necessary action.
2. Inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action.
3. Remove, inspect, and/or replace brake pads and retaining hardware; determine necessary action.
4. Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads and inspect for leaks.
5. Clean and inspect rotor and mounting surface, measure rotor thickness, thickness variation, and lateral runout; determine necessary action.
6. Remove and reinstall/replace rotor.
7. Refinish rotor on vehicle; measure final rotor thickness and compare with specification.
8. Refinish rotor off vehicle; measure final rotor thickness and compare with specification.
9. Retract and re-adjust caliper piston on an integral parking brake system.
10. Check brake pad wear indicator; determine necessary action.
11. Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendation.

BR-E. Power-Assist Units

1. Check brake pedal travel with, and without, engine running to verify proper power booster operation.
2. Identify components of the brake power assist system (vacuum and hydraulic); check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.

BR-F. Related Systems (i.e. Wheel Bearings, Parking Brakes, Electrical)

1. Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings.
2. Check parking brake system components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as needed.
3. Check parking brake operation and parking brake indicator light system operation; determine necessary action.

4. Check operation of brake stop light system.
5. Replace wheel bearing and race.
6. Inspect and replace wheel studs.

BR-G. Electronic Brake, Traction Control, and Stability Control Systems

1. Identify traction control/vehicle stability control system components.
2. Describe the operation of a regenerative braking system.

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VI. ELECTRICAL/ELECTRONIC SYSTEMS

EE-A. General

1. Research vehicle service information including vehicle service history, service precautions, and technical service bulletins.
2. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).
3. Use wiring diagrams to trace electrical/electronic circuits.
4. Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance.
5. Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.
6. Use a test light to check operation of electrical circuits.
7. Use fused jumper wires to check operation of electrical circuits.
8. Measure key-off battery drain (parasitic draw).
9. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.
10. Repair and/or replace connectors, terminal ends, and wiring of electrical/electronic systems (including solder repair)
11. Identify electrical/electronic system components and configuration.

EE-B. Battery Service

1. Perform battery state-of-charge test; determine necessary action.
2. Confirm proper battery capacity for vehicle application; perform battery capacity and load test; determine necessary action.
3. Maintain or restore electronic memory functions.
4. Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.
5. Perform slow/fast battery charge according to manufacturer's recommendations.
6. Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.
7. Identify safety precautions for high voltage systems on electric, hybrid-electric, and diesel vehicles.
8. Identify electrical/electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery.
9. Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures.

EE-C. Starting System

1. Perform starter current draw test; determine necessary action.
2. Perform starter circuit voltage drop tests; determine necessary action.
3. Inspect and test starter relays and solenoids; determine necessary action.
4. Remove and install starter in a vehicle.
5. Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action.
6. Demonstrate knowledge of an automatic idle-stop/start-stop system.

EE-D. Charging System

1. Perform charging system output test; determine necessary action.
2. Inspect, adjust, and/or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment.

3. Remove, inspect, and/or replace generator (alternator).
4. Perform charging circuit voltage drop tests; determine necessary action.

EE-E. Lighting, Instrument Cluster, Driver Information, and Body Electrical Systems

1. Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed.
2. Aim headlights.
3. Identify system voltage and safety precautions associated with high-intensity discharge headlights.
4. Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.
5. Remove and reinstall door panel.
6. Describe the operation of keyless entry/remote-start systems.
7. Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators.
8. Verify windshield wiper and washer operation; replace wiper blades.

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VII. HEATING, VENTILATION, AND AIR CONDITIONING

AC-A. General

1. Research vehicle service information, including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins.
2. Identify heating, ventilation and air conditioning (HVAC) components and configuration.

AC-B. Refrigeration System Components

1. Inspect and replace A/C compressor drive belts, pulleys, and tensioners; visually inspect A/C components for signs of leaks; determine necessary action.
2. Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions.
3. Inspect A/C condenser for airflow restrictions; determine necessary action.

AC-C. Heating, Ventilation, and Engine Cooling Systems

1. Inspect engine cooling and heater systems hoses and pipes; determine necessary action.

AC-D. Operating Systems and Related Controls

1. Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; determine necessary action.
2. Identify the source of A/C system odors.

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VIII. ENGINE PERFORMANCE

EP-A. General

1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.
2. Perform engine absolute manifold pressure tests (vacuum/boost); document results.
3. Perform cylinder power balance test; document results.
4. Perform cylinder cranking and running compression tests; document results
5. Perform cylinder leakage test; document results
6. Verify engine operating temperature.
7. Remove and replace spark plugs; inspect secondary ignition components for wear and damage.

EP-B. Computerized Controls

1. Retrieve and record diagnostic trouble codes (DTC), OBD monitor status, and freeze frame data; clear codes when applicable.
2. Describe the use of the OBD monitors for repair verification.

EP-C. Fuel, Air Induction, and Exhaust Systems

1. Replace fuel filter(s) where applicable.

2. Inspect, service, or replace air filters, filter housings, and intake duct work.
3. Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action.
4. Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine necessary action.
5. Check and refill diesel exhaust fluid (DEF).

EP-D. Emissions Control Systems

1. Inspect, test, and service positive crankcase ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; perform necessary action.

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IX. SUPPLEMENTAL TASKS (GT)

GT-A. Shop and Personal Safety

1. Identify general shop safety rules and procedures.
2. Utilize safe procedures for handling of tools and equipment.
3. Identify and use proper placement of floor jacks and jack stands.
4. Identify and use proper procedures for safe lift operation.
5. Utilize proper ventilation procedures for working within the lab/shop area.
6. Identify marked safety areas.
7. Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.
8. Identify the location and use of eye wash stations.
9. Identify the location of the posted evacuation routes.
10. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.
11. Identify and wear appropriate clothing for lab/shop activities.
12. Secure hair and jewelry for lab/shop activities.
13. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.
14. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).
15. Locate and demonstrate knowledge of material safety data sheets (MSDS).

GT-B. Tools and Equipment

1. Identify tools and their usage in automotive applications.
2. Identify standard and metric designation.
3. Demonstrate safe handling and use of appropriate tools.
4. Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
5. Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper).

GT-C. Preparing Vehicle for Service

1. Identify information needed and the service requested on a repair order.
2. Identify purpose and demonstrate proper use of fender covers, mats.
3. Demonstrate use of the three C's (concern, cause, and correction).
4. Review vehicle service history.
5. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

GT-D. Preparing Vehicle for Customer

1. Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.).

Automobile Service Technology

Content Area	Questions in Test
A. Engine Repair (ER)	9
B. Automatic Transmission and Transaxle (AT)	6
C. Manual Drive Train and Axles (MD)	6
D. Suspension and Steering (SS)	11
E. Brakes (BR)	11
F. Electrical/Electronic Systems (EE)	13
G. Heating and Air Conditioning (AC)	7
H. Engine Performance (EP)	11
I. Supplemental Tasks (GT)	6
Required To Pass: **45** **TOTAL**	80

Notes:
1. Effective August 1, 2017, this test is based on the ***Automobile Service and Repair*** tasks of the 2017 NATEF MLR Automobile Program Standards and is intended for those students who have completed a course of study that corresponds with that level of instruction.

2. This test may include additional questions for statistical evaluation. These extra questions will not count for or against the final score. Since the extra questions are not identified, test candidates should answer every question to the best of their ability.

I. ENGINE REPAIR

ER-A. General: Engine Diagnosis; Removal and Reinstallation (R & R)

1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
2. Research applicable vehicle and service information, including fluid type, internal engine operation, vehicle service history, service precautions, and technical service bulletins.
3. Verify operation of the instrument panel engine warning indicators.
4. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine needed action.
5. Install engine covers using gaskets, seals, and sealers as required.
6. Verify engine mechanical timing.
7. Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.
8. Inspect, remove, and/or replace engine mounts.
9. Identify service precautions related to service of the internal combustion engine of a hybrid vehicle.

ER-B. Cylinder Head and Valve Train Diagnosis and Repair

1. Remove cylinder head; inspect gasket condition; install cylinder head and gasket; tighten according to manufacturer's specification and procedure.
2. Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition.
3. Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine needed action.
4. Adjust valves (mechanical or hydraulic lifters).
5. Inspect and replace camshaft and drive belt/chain; includes checking drive gear wear and backlash, end play, sprocket and chain wear, overhead cam drive sprocket(s), drive belt(s), belt tension, tensioners, camshaft reluctor ring/tone-wheel, and valve timing components; verify correct camshaft timing.
6. Establish camshaft position sensor indexing.

ER-C. Engine Block Assembly Diagnosis and Repair

1. Remove, inspect, and/or replace crankshaft vibration damper (harmonic balancer).

ER-D. Lubrication and Cooling Systems Diagnosis and Repair

1. Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core, and galley plugs; determine needed action.
2. Identify causes of engine overheating.
3. Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.
4. Inspect and test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required.
5. Inspect, remove, and replace water pump.
6. Remove and replace radiator.
7. Remove, inspect, and replace thermostat and gasket/seal.
8. Inspect and test fan(s), fan clutch (electrical or mechanical), fan shroud, and air dams; determine needed action.
9. Perform oil pressure tests; determine needed action.
10. Perform engine oil and filter change; use proper fluid type per manufacturer specification.
11. Inspect auxiliary coolers; determine needed action.
12. Inspect, test, and replace oil temperature and pressure switches and sensors.

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II. AUTOMATIC TRANSMISSION AND TRANSAXLE

AT-A. General: Transmission and Transaxle Diagnosis

1. Identify and interpret transmission/transaxle concerns, differentiate between engine performance and transmission/transaxle concerns; determine needed action.
2. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins.
3. Diagnose fluid loss and condition concerns; determine needed action.
4. Check fluid level and condition in a transmission or a transaxle equipped with a dip-stick.
5. Check fluid level and condition in a transmission or a transaxle not equipped with a dip-stick.
6. Perform stall test; determine needed action.
7. Perform lock-up converter system tests; determine needed action.
8. Diagnose transmission/transaxle gear reduction/multiplication concerns using driving, driven, and held member (power flow) principles.
9. Diagnose pressure concerns in a transmission using hydraulic principles (Pascal's Law).
10. Demonstrate knowledge of pressure test including transmissions/transaxles equipped with electronic pressure control.
11. Diagnose electronic transmission/transaxle control systems using appropriate test equipment and service information.

AT-B. In-Vehicle Transmission/Transaxle Maintenance and Repair

1. Inspect, adjust, and/or replace external manual valve shift linkage, transmission range sensor/switch, and/or park/neutral position switch.
2. Inspect for leakage; replace external seals, gaskets, and bushings.
3. Inspect, test, adjust, repair, and/or replace electrical/electronic components and circuits including computers, solenoids, sensors, relays, terminals, connectors, switches, and harnesses; demonstrate understanding of relearn procedure.
4. Drain and replace fluid and filter(s); use proper fluid type per manufacturer specification.
5. Inspect, replace and align power train mounts.

AT-C. Off-Vehicle Transmission and Transaxle Repair

1. Remove and reinstall transmission/transaxle and torque converter; inspect engine core plugs, rear crankshaft seal, dowel pins, dowel pin holes, and mating surfaces.
2. Inspect, leak test, flush, and/or replace transmission/transaxle oil cooler, lines, and fittings.
3. Inspect converter flex (drive) plate, converter attaching bolts, converter pilot, converter pump drive surfaces, converter end play, and crankshaft pilot bore.
4. Describe the operational characteristics of a continuously variable transmission (CVT).

5. Describe the operational characteristics of a hybrid vehicle drive train.

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III. MANUAL DRIVE TRAIN AND AXLES

MD-A. General: Drive Train Diagnosis

1. Identify and interpret drive train concerns; determine needed action.
2. Research vehicle and service information including fluid type, vehicle service history, service precautions, and technical service bulletins.
3. Check fluid condition; check for leaks; determine needed action.
4. Drain and refill manual transmission/transaxle and final drive unit; use proper fluid type per manufacturer specification.

MD-B. Clutch Diagnosis and Repair

1. Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine needed action.
2. Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; determine needed action.
3. Inspect and/or replace clutch pressure plate assembly, clutch disc, release (throw-out) bearing, linkage, and pilot bearing/bushing (as applicable).
4. Bleed clutch hydraulic system.
5. Check and adjust clutch master cylinder fluid level; check for leaks; use proper fluid type per manufacturer specification.
6. Inspect flywheel and ring gear for wear and cracks; determine needed action.
7. Measure flywheel runout and crankshaft end play; determine needed action.
8. Describe the operation and service of a system that uses a dual mass flywheel.

MD-C. Transmission/Transaxle Diagnosis and Repair

1. Inspect, adjust, lubricate, and/or replace shift linkages, brackets, bushings, cables, pivots, and levers.
2. Describe the operational characteristics of an electronically-controlled manual transmission/transaxle.

MD-D. Drive Shaft and Half Shaft, Universal and Constant-Velocity (CV) Joint Diagnosis and Repair (Front, Rear, All-wheel, Four-wheel drive)

1. Diagnose constant-velocity (CV) joint noise and vibration concerns; determine needed action.
2. Diagnose universal joint noise and vibration concerns; determine needed action.
3. Inspect, remove, and/or replace bearings, hubs, and seals.
4. Inspect, service, and/or replace shafts, yokes, boots, and universal/CV joints.
5. Check shaft balance and phasing; measure shaft runout; measure and adjust driveline angles.

MD-E. Drive Axle Diagnosis and Repair

E.1 Ring and Pinion Gears and Differential Case Assembly

1. Clean and inspect differential case; check for leaks; inspect housing vent.
2. Check and adjust differential case fluid level; use proper fluid type per manufacturer specification.
3. Drain and refill differential case; using proper fluid type per manufacturer specification.
4. Inspect and replace companion flange and/or pinion seal; measure companion flange runout.

E.2 Drive Axles

1. Inspect and replace drive axle wheel studs.
2. Remove and replace drive axle shafts.
3. Inspect and replace drive axle shaft seals, bearings, and retainers.
4. Measure drive axle flange runout and shaft end play; determine needed action.

MD-F. Four-wheel Drive/All-wheel Drive Component Diagnosis and Repair

1. Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets.
2. Inspect locking hubs; determine needed action(s).
3. Check for leaks at drive assembly and transfer case seals; check vents; check fluid level; use proper fluid type per manufacturer specification.
4. Identify concerns related to variations in tire circumference and/or final drive ratios.

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IV. SUSPENSION AND STEERING

SS-A. General: Suspension and Steering Systems

1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.
2. Identify and interpret suspension and steering system concerns; determine needed action.

SS-B. Steering Systems Diagnosis and Repair

1. Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.
2. Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring).
3. Diagnose steering column noises, looseness, and binding concerns (including tilt/telescoping mechanisms); determine needed action.
4. Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine needed action.
5. Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine needed action.
6. Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; determine needed action.
7. Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets.
8. Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots; replace as needed.
9. Inspect power steering fluid level and condition.
10. Flush, fill, and bleed power steering system; using proper fluid type per manufacturer specification.
11. Inspect for power steering fluid leakage; determine needed action.
12. Remove, inspect, replace, and/or adjust power steering pump drive belt.
13. Remove and reinstall power steering pump.
14. Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment.
15. Inspect, remove, and/or replace power steering hoses and fittings.
16. Inspect, remove, and/or replace pitman arm, relay (centerlink/intermediate) rod, idler arm, mountings, and steering linkage damper.
17. Inspect, replace, and/or adjust tie rod ends (sockets), tie rod sleeves, and clamps.
18. Identify hybrid vehicle power steering system electrical circuits and safety precautions.
19. Inspect electric power steering assist system.

SS-C. Suspension Systems Diagnosis and Repair

1. Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine needed action.
2. Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine needed action.
3. Inspect, remove and/or replace upper and lower control arms, bushings, shafts, and rebound bumpers.
4. Inspect, remove and/or replace strut rods and bushings.
5. Inspect, remove and/or replace upper and/or lower ball joints (with or without wear indicators).
6. Inspect, remove and/or replace steering knuckle assemblies.
7. Inspect, remove and/or replace short and long arm suspension system coil springs and spring insulators.
8. Inspect, remove and/or replace torsion bars and mounts.
9. Inspect, remove and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links.

10. Inspect, remove and/or replace strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.
11. Inspect, remove and/or replace track bar, strut rods/radius arms, and related mounts and bushings.
12. Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts.

SS-D. Related Suspension and Steering Service

1. Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings.
2. Remove, inspect, service, and/or replace front and rear wheel bearings.
3. Describe the function of suspension and steering control systems and components, (i.e. active suspension and stability control).

SS-E. Wheel Alignment Diagnosis, Adjustment, and Repair

1. Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine needed action.
2. Perform prealignment inspection; measure vehicle ride height; determine needed action.
3. Prepare vehicle for wheel alignment on alignment machine; perform four-wheel alignment by checking and adjusting front and rear wheel caster, camber; and toe as required; center steering wheel.
4. Check toe-out-on-turns (turning radius); determine needed action.
5. Check steering axis inclination (SAI) and included angle; determine needed action.
6. Check rear wheel thrust angle; determine needed action.
7. Check for front wheel setback; determine needed action.
8. Check front and/or rear cradle (subframe) alignment; determine needed action.
9. Reset steering angle sensor

SS-F. Wheels and Tires Diagnosis and Repair

1. Inspect tire condition; identify tire wear patterns; check for correct, tire size, application (load and speed ratings), and air pressure as listed on the tire information placard/label.
2. Diagnose wheel/tire vibration, shimmy, and noise; determine needed action.
3. Rotate tires according to manufacturer's recommendation including vehicles equipped with tire pressure monitoring system (TPMS).
4. Measure wheel, tire, axle flange, and hub runout; determine needed action.
5. Diagnose tire pull problems; determine needed action.
6. Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly.
7. Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.
8. Inspect tire and wheel assembly for air loss; determine needed action.
9. Repair tire following vehicle manufacturer approved procedure.
10. Identify indirect and direct tire pressure monitoring systems (TPMS); calibrate system; verify operation of instrument panel lamps.
11. Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system (TPMS) including relearn procedure.

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V. BRAKES

BR-A. General: Brake Systems Diagnosis

1. Identify and interpret brake system concerns; determine needed action.
2. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins.
3. Describe procedure for performing a road test to check brake system operation including an anti-lock brake system (ABS).
4. Install wheel and torque lug nuts.

BR-B. Hydraulic System Diagnosis and Repair

1. Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law).
2. Measure brake pedal height, travel, and free play (as applicable); determine needed action.
3. Check master cylinder for internal/external leaks and proper operation; determine needed action.
4. Remove, bench bleed, and reinstall master cylinder.
5. Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine needed action.
6. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, and loose fittings/supports; determine needed action.
7. Replace brake lines, hoses, fittings, and supports.
8. Fabricate brake lines using proper material and flaring procedures (double flare and ISO types).
9. Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification.
10. Inspect, test, and/or replace components of brake warning light system.
11. Identify components of hydraulic brake warning light system.
12. Bleed and/or flush brake system.
13. Test brake fluid for contamination.

BR-C. Drum Brake Diagnosis and Repair

1. Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine needed action.
2. Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability.
3. Refinish brake drum and measure final drum diameter; compare with specification.
4. Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.
5. Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.
6. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments.

BR-D. Disc Brake Diagnosis and Repair

1. Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging, or pulsation concerns; determine needed action.
2. Remove and clean caliper assembly; inspect for leaks, damage, and wear; determine needed action.
3. Inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine needed action.
4. Remove, inspect, and/or replace brake pads and retaining hardware; determine needed action.
5. Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads; inspect for leaks.
6. Clean and inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine needed action.
7. Remove and reinstall/replace rotor.
8. Refinish rotor on vehicle; measure final rotor thickness and compare with specification.
9. Refinish rotor off vehicle; measure final rotor thickness and compare with specification.
10. Retract and re-adjust caliper piston on an integrated parking brake system.
11. Check brake pad wear indicator; determine needed action.
12. Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations.

BR-E. Power-Assist Units Diagnosis and Repair

1. Check brake pedal travel with and without engine running to verify proper power booster operation.
2. Identify components of the brake power assist system (vacuum and hydraulic); check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.
3. Inspect vacuum-type power booster unit for leaks; inspect the check-valve for proper operation; determine needed action.
4. Inspect and test hydraulically-assisted power brake system for leaks and proper operation; determine needed action.

5. Measure and adjust master cylinder pushrod length.

BR-F. Related Systems (i.e. Wheel Bearings, Parking Brakes, Electrical) Diagnosis and Repair

1. Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine needed action.
2. Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings.
3. Check parking brake system components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as needed.
4. Check parking brake operation and parking brake indicator light system operation; determine needed action.
5. Check operation of brake stop light system.
6. Replace wheel bearing and race.
7. Inspect and replace wheel studs.
8. Remove, reinstall, and/or replace sealed wheel bearing assembly.

BR-G. Electronic Brake Control Systems: Antilock Brake (ABS), Traction Control (TCS) and Electronic Stability Control (ESC) Systems Diagnosis and Repair

1. Identify and inspect electronic brake control system components (ABS, TCS, ESC); determine needed action.
2. Describe the operation of a regenerative braking system.

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VI. ELECTRICAL/ELECTRONIC SYSTEMS

EE-A. General: Electrical System Diagnosis

1. Research applicable vehicle and service information including vehicle service history, service precautions, and technical service bulletins.
2. Demonstrate knowledge of electrical/electronic series, parallel, and series- parallel circuits using principles of electricity (Ohm's Law).
3. Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow and resistance.
4. Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.
5. Demonstrate proper use of a test light on an electrical circuit.
6. Use fused jumper wires to check operation of electrical circuits.
7. Use wiring diagrams during the diagnosis (troubleshooting) of electrical/electronic circuit problems.
8. Diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine needed action.
9. Inspect and test fusible links, circuit breakers, and fuses; determine needed action.
10. Inspect, test, repair, and/or replace components, connectors, terminals, harnesses, and wiring in electrical/electronic systems (including solder repairs); determine needed action.

EE-B. Battery Diagnosis and Service

1. Perform battery state-of-charge test; determine needed action.
2. Confirm proper battery capacity for vehicle application; perform battery capacity and load test; determine needed action.
3. Maintain or restore electronic memory functions.
4. Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.
5. Perform slow/fast battery charge according to manufacturer's recommendations.
6. Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.
7. Identify safety precautions for high voltage systems on electric, hybrid- electric, and diesel vehicles.
8. Identify electrical/electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery.
9. Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures.

EE-C. Starting System Diagnosis and Repair

1. Perform starter current draw tests; determine needed action.
2. Perform starter circuit voltage drop tests; determine needed action.
3. Inspect and test starter relays and solenoids; determine needed action.
4. Remove and install starter in a vehicle.
5. Inspect and test switches, connectors, and wires of starter control circuits; determine needed action.
6. Differentiate between electrical and engine mechanical problems that cause a slow-crank or a no-crank condition.
7. Demonstrate knowledge of automatic idle-stop/start-stop system.

EE-D. Charging System Diagnosis and Repair

1. Perform charging system output test; determine needed action.
2. Diagnose (troubleshoot) charging system for causes of undercharge, no- charge, or overcharge conditions.
3. Inspect, adjust, and/or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment.
4. Remove, inspect, and/or replace generator (alternator).
5. Perform charging circuit voltage drop tests; determine needed action.

EE-E. Lighting Systems Diagnosis and Repair

1. Diagnose (troubleshoot) the causes of brighter-than-normal, intermittent, dim, or no light operation; determine needed action.
2. Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed.
3. Aim headlights.
4. Identify system voltage and safety precautions associated with high-intensity discharge headlights.

EE-F. Instrument Cluster and Driver Information Systems Diagnosis and Repair

1. Inspect and test gauges and gauge sending units for causes of abnormal readings; determine needed action.
2. Diagnose (troubleshoot) the causes of incorrect operation of warning devices and other driver information systems; determine needed action.
3. Reset maintenance indicators as required.

EE-G. Body Electrical Systems Diagnosis and Repair

1. Describe operation of comfort and convenience accessories and related circuits (such as: power window, power seats, pedal height, power locks, truck locks, remote start, moon roof, sun roof, sun shade, remote keyless entry, voice activation, steering wheel controls, back-up camera, park assist, cruise control, and auto dimming headlamps); determine needed repairs.
2. Describe operation of security/anti-theft systems and related circuits (such as: theft deterrent, door locks, remote keyless entry, remote start, and starter/fuel disable); determine needed repairs. 3. Describe operation of entertainment and related circuits (such as: radio, DVD, remote CD changer, navigation, amplifiers, speakers, antennas, and voice-activated accessories); determine needed repairs.
4. Describe operation of safety systems and related circuits (such as: horn, airbags, seat belt pretensioners, occupancy classification, wipers, washers, speed control/collision avoidance, heads-up display, park assist, and back-up camera); determine needed repairs.
5. Describe body electronic systems circuits using a scan tool; check for module communication errors (data bus systems); determine needed action.
6. Describe the process for software transfer, software updates, or reprogramming of electronic modules.

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VII. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

AC-A. General: A/C System Diagnosis and Repair

1. Identify and interpret heating and air conditioning problems; determine needed action.

2. Research vehicle service information including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins.
3. Performance test A/C system; identify problems.
4. Identify abnormal operating noises in the A/C system; determine needed action.
5. Identify refrigerant type; select and connect proper gauge set/test equipment; record temperature and pressure readings.
6. Leak test A/C system; determine needed action.
7. Inspect condition of refrigerant oil removed from A/C system; determine needed action.
8. Determine recommended oil and oil capacity for system application.
9. Using a scan tool, observe and record related HVAC data and trouble codes.

AC-B. Refrigeration System Component Diagnosis and Repair

1. Inspect, remove, and/or replace A/C compressor drive belts, pulleys, and tensioners; visually inspect A/C components for signs of leaks; determine needed action.
2. Inspect, test, service, and/or replace A/C compressor clutch components and/or assembly; check compressor clutch air gap; adjust as needed.
3. Remove, inspect, and reinstall A/C compressor and mountings; determine recommended oil type and quantity.
4. Identify hybrid vehicle A/C system electrical circuits and service/safety precautions.
5. Determine need for an additional A/C system filter; determine needed action.
6. Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals, and service valves; determine needed action.
7. Inspect for proper A/C condenser airflow; determine needed action.
8. Remove, inspect, and reinstall receiver/drier or accumulator/drier; determine recommended oil type and quantity.
9. Remove, inspect, and install expansion valve or orifice (expansion) tube.
10. Inspect evaporator housing water drain; determine needed action.
11. Determine procedure to remove and reinstall evaporator; determine required oil type and quantity.

AC-C. Heating, Ventilation, and Engine Cooling Systems Diagnosis and Repair

1. Inspect engine cooling and heater systems hoses and pipes; determine needed action.
2. Inspect and test heater control valve(s); determine needed action.
3. Determine procedure to remove, inspect, reinstall, and/or replace heater core.

AC-D. Operating Systems and Related Controls Diagnosis and Repair

1. Inspect and test HVAC system blower motors, resistors, switches, relays, wiring, and protection devices; determine needed action.
2. Diagnose HVAC system clutch control systems; determine needed action.
3. Diagnose malfunctions in the vacuum, mechanical, and electrical components and controls of the heating, ventilation, and A/C (HVAC) system; determine needed action.
4. Inspect and test HVAC system control panel assembly; determine needed action.
5. Inspect and test HVAC system control cables, motors, and linkages; determine needed action.
6. Inspect HVAC system ducts, doors, hoses, cabin filters, and outlets; determine needed action.
7. Identify the source of HVAC system odors.
8. Check operation of automatic or semi-automatic HVAC control systems; determine needed action.

AC-E. Refrigerant Recovery, Recycling, and Handling

1. Perform correct use and maintenance of refrigerant handling equipment according to equipment manufacturer's standards.
2. Identify A/C system refrigerant; test for sealants; recover, evacuate, and charge A/C system; add refrigerant oil as required.
3. Recycle, label, and store refrigerant.

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VIII. ENGINE PERFORMANCE

EP-A. General: Engine Diagnosis

1. Identify and interpret engine performance concerns; determine needed action.
2. Research vehicle service information, including vehicle service history, service precautions, and technical service bulletins.
3. Diagnose abnormal engine noises or vibration concerns; determine needed action.
4. Diagnose the cause of excessive oil consumption coolant consumption, unusual exhaust color, odor, and sound; determine needed action.
5. Perform engine absolute manifold pressure tests (vacuum/boost); determine needed action.
6. Perform cylinder power balance test; determine needed action.
7. Perform cylinder cranking and running compression tests; determine needed action.
8. Perform cylinder leakage test; determine needed action.
9. Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine needed action.
10. Verify engine operating temperature; determine needed action.
11. Verify correct camshaft timing including variable valve timing (VVT) systems.

EP-B. Computerized Controls Diagnosis and Repair

1. Retrieve and record diagnostic trouble codes (DTC), OBD monitor status, and freeze frame data; clear codes when applicable.
2. Access and use service information to perform step-by-step (troubleshooting) diagnosis.
3. Perform active tests of actuators using a scan tool; determine needed action.
4. Describe the use of OBD monitors for repair verification.

EP-C. Ignition System Diagnosis and Repair

1. Diagnose (troubleshoot) ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, poor mileage, and emissions concerns; determine needed action.
2. Inspect and test crankshaft and camshaft position sensor(s); determine needed action.
3. Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram/initialize as needed.
4. Remove and replace spark plugs; inspect secondary ignition components for wear and damage.

EP-D. Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair

1. Check fuel for contaminants; determine needed action.
2. Inspect and test fuel pump(s) and pump control system for pressure, regulation, and volume; determine needed action.
3. Replace fuel filter(s) where applicable.
4. Inspect, service, or replace air filters, filter housings, and intake duct work.
5. Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.
6. Inspect, test and/or replace fuel injectors.
7. Verify idle control operation.
8. Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine needed action.
9. Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine needed action.
10. Perform exhaust system back-pressure test; determine needed action.
11. Check and refill diesel exhaust fluid (DEF).

EP-E. Emissions Control Systems Diagnosis and Repair

1. Diagnose oil leaks, emissions, and driveability concerns caused by the positive crankcase ventilation (PCV) system; determine needed action.
2. Inspect, test, service and/or replace positive crankcase ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; determine needed action.
3. Diagnose emissions and driveability concerns caused by the exhaust gas recirculation (EGR) system; inspect, test, service and/or replace electrical/electronic sensors, controls, wiring, tubing, exhaust passages,

vacuum/pressure controls, filters, and hoses of exhaust gas recirculation (EGR) system; determine needed action.
4. Inspect and test electrical/electronically-operated components and circuits of secondary air injection systems; determine needed action.
5. Diagnose emissions and driveability concerns caused by the catalytic converter system; determine needed action.
6. Inspect and test components and hoses of the evaporative emissions control (EVAP) system; determine needed action.
7. Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine needed action.

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IX. SUPPLEMENTAL TASKS (GT)

GT-A. Shop and Personal Safety

1. Identify general shop safety rules and procedures.
2. Utilize safe procedures for handling of tools and equipment.
3. Identify and use proper placement of floor jacks and jack stands.
4. Identify and use proper procedures for safe lift operation.
5. Utilize proper ventilation procedures for working within the lab/shop area.
6. Identify marked safety areas.
7. Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.
8. Identify the location and use of eye wash stations.
9. Identify the location of the posted evacuation routes.
10. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.
11. Identify and wear appropriate clothing for lab/shop activities.
12. Secure hair and jewelry for lab/shop activities.
13. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.
14. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).
15. Locate and demonstrate knowledge of material safety data sheets (MSDS).

GT-B. Tools and Equipment

1. Identify tools and their usage in automotive applications.
2. Identify standard and metric designation.
3. Demonstrate safe handling and use of appropriate tools.
4. Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
5. Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper).

GT-C. Preparing Vehicle for Service

1. Identify information needed and the service requested on a repair order.
2. Identify purpose and demonstrate proper use of fender covers, mats.
3. Demonstrate use of the three C's (concern, cause, and correction).
4. Review vehicle service history.
5. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

GT-D. Preparing Vehicle for Customer

1. Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.).