Automotive Maintenance and Light Duty Repair I Competencies
NATEF Certification

1. **ENGINE REPAIR**
    a. General
        i. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
        ii. Verify operation of the instrument panel engine warning indicators.
        iii. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
        iv. Install engine covers using gaskets, seals, and sealers as required.
        v. Remove and replace timing belt; verify correct camshaft timing.
        vi. Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.
        vii. Identify hybrid vehicle internal combustion engine service precautions.
    b. Cylinder Head and Valve Train
        i. Adjust valves (mechanical or hydraulic lifters)
    c. Lubrication and Cooling Systems
        i. Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, and heater core; determine necessary action.
        ii. Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.
        iii. Remove, inspect, and replace thermostat and gasket/seal.
        iv. Inspect and test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.
        v. Perform engine oil and filter change.

2. **BRAKES**
    a. General
        i. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
        ii. Describe procedure for performing and road test to check brake system operation, including an anti-lock brake system (ABS).
    b. Hydraulic System
        i. Measure brake pedal height, travel, and free play (as applicable); determine necessary action.
        ii. Check master cylinder for external leaks and proper operation.
        iii. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, loose fittings and supports; determine necessary action.
        iv. Select, handle, store, and fill brake fluids to proper level.
        v. Identify components of brake warning light system.
        vi. Bleed and/or flush brake system.
        vii. Test brake fluid for contamination.
    c. Drum Brakes

i. Remove, clean, inspect, and measure brake drum diameter; determine necessary action.
ii. Refinish brake drum and measure final drum diameter; compare with specifications.
iii. Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other elated brake hardware, and backing support plates; lubricate and reassemble.
iv. Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.
v. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments.
vi. Install wheel and torque lug nuts.

d. Disc Brakes
i. Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action.
ii. Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action.
iii. Remove, inspect, and replace pads and retaining hardware; determine necessary action.
iv. Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks.
v. Clean and inspect rotor, measure rotor thickness, thickness variation, and lateral runout; determine necessary action.
vi. Remove and reinstall rotor.
vii. Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.
viii. Refinish rotor off vehicle; measure final rotor thickness and compare with specifications.
ix. Retract and re-adjust caliper piston on an integral parking brake system.
x. Check brake pad war indicator; determine necessary action.
xi. Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations.

e. Power-Assist Units
i. Check brake pedal travel with, and without, engine running to verify proper power booster operation.
ii. Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.

f. Miscellaneous (Wheel Bearings, Parking Brakes, Electrical, Etc.)
i. Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings.
ii. Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.
iii. Check parking brake operation and parking brake indicator light system operation; determine necessary action.
iv. Check operation of brake stop light system.
v. Replace wheel bearing and trace.

g. Electronic Brakes, and Traction and Stability Control System
i. Identify traction control/vehicle stability control system components.
ii. Describe the operation of a regenerative braking system.

3. ELECTRICAL/ELECTRONIC SYSTEMS

a. General

i. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
ii. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).
iii. Use wiring diagrams to trace electrical/electronic circuits.
iv. Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance.
v. Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.
vi. Check operation of electrical circuits with a test light.
vii. Check operation of electrical circuits with fused jumper wires.
viii. Measure key-off battery drain (parasitic draw).
ix. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.
x. Perform solder repair of electrical wiring.
xi. Replace electrical connectors and terminal ends.

b. Battery Service
i. Perform battery state-of-charge test; determine necessary action.
ii. Confirm proper battery capacity for vehicle application; perform battery capacity test; determine necessary action.
iii. Maintain or restore electronic memory functions.
iv. Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.
v. Perform slow/fast battery charge according to manufacturer's recommendations.

4. **EMPLOYABILITY SKILLS/CAREER PREPARATION**
a. Understand how personal skill development affects employability (positive attitude, honesty, self-confidence, time management).
b. Understand principles of effective interpersonal skills (group dynamics, conflict resolution, negotiations).
c. Understand the importance of good academic skills, critical thinking and problem-solving in the workplace.
d. Understand principles of effective communication.
e. Understand occupational safety issues and observe all shop safety rules.
f. Understand career awareness, paths and strategies for obtaining employment.
g. Understand and adapt to changing technology.
h. Understand and prepare for employment (resume, job application, job interview, portfolio development).
i. Understands occupational and shop procedures.
j. Understands the use and handling of shop tools and equipment.