NATEF BRAKES

For every task in Brakes, the following safety requirement must be strictly enforced:

Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Evaluation Matrix:
1 = Exposure/Observation
2 = Assisted in Performing
3 = Capable, Needs Practice
4 = Performed Satisfactorily
5 = Demonstrated Mastery

A5. BRAKES

		Evaluation Sign-Off
A. General Brake Systems Diagnosis		
1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	P-1	
2. Identify and interpret brake system concern; determine necessary action.	P-1	
3. Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins.	P-1	
4. Locate and interpret vehicle and major component identification numbers.	P-1	
B. Hydraulic System Diagnosis and Repair		
1. Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law).	P-1	
2. Measure brake pedal height, travel, and free play (as applicable); determine necessary action.	P-1	
3. Check master cylinder for internal/external leaks and proper operation; determine necessary action.	P-1	
4. Remove, bench bleed, and reinstall master cylinder.	P-1	
5. Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action.	P-2	
6. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action.	P-1	
7. Replace brake lines, hoses, fittings, and supports.	P-2	
8. Fabricate brake lines using proper material and flaring procedures (double flare and ISO types).	P-2	
9. Select, handle, store, and fill brake fluids to proper level.	P-1	
10. Inspect, test, and/or replace metering (hold-off), proportioning (balance), pressure differential, and combination valves.	P-3	
11. Inspect, test, and/or replace components of brake warning light system.	P-3	
12. Bleed and/or flush brake system.	P-1	
13. Test brake fluid for contamination.	P-1	

		Evaluation Sign-Off
C. Drum Brake Diagnosis and Repair		
1. Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.	P-1	
2. Remove, clean, inspect, and measure brake drums; determine necessary action.	P-1	
3. Refinish brake drum; measure final drum diameter.	P-1	
4. Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.	P-1	
5. Inspect and install wheel cylinders.	P-2	
6. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings.	P-2	
7. Install wheel, torque lug nuts, and make final checks and adjustments.	P-1	
D. Disc Brake Diagnosis and Repair		
1. Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pulsation concerns; determine necessary action.	P-1	
2. Remove caliper assembly; inspect for leaks and damage to caliper housing; determine necessary action.	P-1	
3. Clean and inspect caliper mounting and slides/pins for operation, wear, and damage; determine necessary action.	P-1	
4. Remove, inspect and replace pads and retaining hardware; determine necessary action.	P-1	
5. Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts.	P-3	
6. Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks.	P-1	
7. Clean, inspect, and measure rotor thickness, lateral runout, and thickness variation; determine necessary action.	P-1	
8. Remove and reinstall rotor.	P-1	
9. Refinish rotor on vehicle; measure final rotor thickness.	P-1	
10. Refinish rotor off vehicle; measure final rotor thickness.	P-1	
11. Retract caliper piston on an integrated parking brake system.	P-3	
12. Install wheel, torque lug nuts, and make final checks and adjustments.	P-1	
13. Check brake pad wear indicator system operation; determine necessary action.	P-2	
E. Power Assist Units Diagnosis and Repair		
1. Test pedal free travel; check power assist operation.	P-2	
2. Check vacuum supply to vacuum-type power booster.	P-1	
3. Inspect the vacuum-type power booster unit for leaks; inspect the check valve for proper operation; determine necessary action.	P-1	
4. Inspect and test hydraulically assisted power brake system for leaks and proper operation; determine necessary action.	P-3	
5. Measure and adjust master cylinder pushrod length.	P-3	

F. Miscellaneous (Wheel Bearings, Parking Brakes, Electrical, Etc.) Diagnosis and Repair		Evaluation Sign-Off
1. Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.	P-1	
2. Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust bearings.	P-1	
3. Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.	P-2	
4. Check parking brake and indicator light system operation; determine necessary action.	P-1	
5. Check operation of brake stop light system; determine necessary action.	P-1	
6. Replace wheel bearing and race.	P-2	
7. Inspect and replace wheel studs.	P-1	
8. Remove and reinstall sealed wheel bearing assembly.	P-1	

G. Electronic Brake, Traction and Stability Control Systems Diagnosis and Repair	
1. Identify and inspect electronic brake control system components; determine necessary action.	P-1
2. Diagnose poor stopping, wheel lock-up, abnormal pedal feel, unwanted application, and noise concerns associated with the electronic brake control system ; determine necessary action.	P-2
3. Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action.	P-1
4. Depressurize high-pressure components of the electronic brake control system.	P-3
5. Bleed the electronic brake control system hydraulic circuits.	P-1
6. Remove and install electronic brake control system electrical/electronic and hydraulic components.	P-3
7. Test, diagnose, and service electronic brake control system speed sensors (digital and analog), toothed ring (tone wheel), and circuits using a graphing multi-meter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground, and frequency data).	P-1
8. Diagnose electronic brake control system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).	P-3
9. Identify traction control/vehicle stability control system components.	P-3
10. Describe the operation of a regenerative braking system.	P-3

Brake Task Priority Breakdown

P-1 = 39 _____No. Completed (95% - 37 Required for NATEF)
P-2 = 10 _____No. Completed (80% - 8 Required for NATEF)
P-3 = 11 _____No. Completed (50% - 5 Required for NATEF)

Instructor's Sign Off: _____ Date _____