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Unit Standard 23818

PRACTICE PAPER - ANSWER BANK

Assessors Note:

This answer bank should be used as the primary resource when marking students work. However, responses to some questions may be subjective and tutors are advised to exercise their professional judgement when making assessment decisions.

ELEMENT ONE

Demonstrate knowledge of braking system fault diagnosis and repair requirements for light vehicles.

1a When servicing brakes on light vehicles what precautions and inspections should be made?

Each item will need to be inspected for evidence of hydraulic leakage, overheating, corrosion, security, wear and damage. Should any of these conditions exist the brake component will need to be repaired or replaced as necessary. The manufacturer's procedures must be consulted to repair or replace the faulty component.

1b Why is it necessary to manually adjust brakes when doing a routine brake inspection?

Rear brake shoes have automatic adjustment mechanisms which adjust shoe travel to compensate for lining wear. They are not very effective and work only where there is excessive brake shoe clearance between drum and shoe. Whenever brakes are inspected shoes should be adjusted manually to take up any clearance.

1c Give a brief outline of the necessary servicing requirements when topping up, inspecting or changing brake fluid.

Brake fluid should be changed on servicing intervals as recommended by the manufacturer and the reservoir seal should be well maintained. Brake fluid must be the same dot rating as recommended by the manufacturer or higher. Check for any dirty discolouration of the brake fluid.

1d What are the requirements for cleaning brake components?

Clean brake components to remove brake fluid, grease, oil and asbestos dust from brake linings, pads and drums. This is to be done before a full inspection. Be sure to use a brake wash machine, water and catch tray or specific brake cleaning products.

2. Provide a WOF rule that applies to each of the following:

2a. Brake modification:

Any brake modifications from original must be certified to comply with the current regulations that are in force by a certified technician.

2b. Brake condition:

Brakes must be capable of easy adjustment. Brakes must be maintained in efficient and in good working order.

2c. Brake performance:

All vehicles must be equipped with a service brake (foot brake) that operates on all wheels.

All vehicles must be equipped with an independent parking brake (hand brake) that operates on at least half of the vehicles wheels.

The service brake must stop the vehicle within a distance of seven metres at 30 Km/h or have a brake efficiency of not less than 50% as measured on a Tapley Meter.

The parking brake must stop the vehicle within a distance of eighteen metres at 30 Km/h or have a brake efficiency of not less than 20% as measured on a Tapley Meter or hold the vehicle on a 1 in 5 gradient hill.

Brakes must be capable of easy adjustment.

Brakes must be maintained in efficient and in good working order.

2d. Brake Repairs:

All brake repairs must be carried out to manufacturer's specifications. Brake repairs are to be carried out by competent automotive technicians.

2e. Brake component replacement:

Components that are replaced must meet the recommended specifications of the manufacturer. Brake linings and cylinders at the wheels must be replaced as a set on both ends of the axle, never replace only one side as this may cause uneven braking.

3. What is the term used for 'absorption' of moisture in brake fluid?

Hygroscopic

4. From the following statements indicate which True (T) are and which False (F) are by writing the corresponding letter in the box provided.

F

Dot 4 is synthetic and will not absorb moisture because it is manmade.

F

Brake fluid from an opened container is suitable to be used as long as it is Dot 5 or higher.

F

New Dot 5 brake fluid in its original container will not damage paint due to its synthetic properties.

F

DOT 3 brake fluid should be changed every 48 months or after major brake work has been completed, as per manufacturer's specifications.

5. How should brake parts be cleaned?

A catchment container should be used and water or an approved brake cleaner so brake dust and contaminants are contained and disposed of correctly to eliminate any health risks associated with asbestos or other harmful materials.

6. What is the correct method of testing brake efficiency?

A road test should only be carried out if the vehicle has a firm brake pedal and a firm handbrake after service. When road testing a vehicle a technician must check for the following braking abnormalities:

Excessive pedal travel, excessive brake pedal effort, brake roughness or chatter, uneven braking, grinding or grating noises, heavy brake drag, hard pedal, spongy pedal, vehicle pulling to one side, pedal gradually going to the floor, grabbing brakes, brake warning light staying on, burning smell from the brakes, handbrake not releasing, handbrake not holding

During a road test the technician is required to use a Tapley Meter to record the service and park brake stopping efficiencies.

7. Describe the method for testing brakes using a tapley meter?

The Tapley meter must be positioned on the passenger's floor and once level the machine will need to be set to zero.

The vehicle is then driven and the foot brake applied. The vehicle must stop within a distance of seven metres at 30 Km/h or have a brake efficiency reading on the tapley meter of not less than 50%.

The vehicle is then driven again and the parking brake applied. This must stop the vehicle within a distance of eighteen metres at 30 Km/h or have a brake efficiency of not less than 20% as measured on a Tapley Meter or hold the vehicle on a 1 in 5 gradient hill.

8. In the following statements state whether TRUE or FALSE. Write T or F in the box provided.

 F

All vehicles must be equipped with a service brake (foot brake) that operates on one of its wheels.

 T

All vehicles must be equipped with an independent parking brake (hand brake) that operates on at least half of the vehicles wheels.

 T

Brakes must be capable of easy adjustment.

 F

The service brake (foot brake) must stop the vehicle within a distance of seven meters at 50 km/h, or have a braking efficiency of not less than 10% as measured on a tapley meter.

9. Provide One inspection required when checking the following braking system components,

Master cylinder:

Check the condition of the master cylinder reservoir cap and rubber seal. Ensure that they are properly seated and locked in place. Check for external leaks from the brake pipe fittings and end bore seal and that master cylinder is mounted securely.

Wheel cylinder: Pull back the wheel cylinder dust boots and inspect for signs of brake fluid. If brake fluid is present, the wheel cylinders will need to be overhauled or replaced.

Check the security of the wheel cylinder to the backing plate and for signs of brake fluid at the brake pipe connection. If any of these conditions exist the fault must be repaired or the component replaced.

Brake pipe: Check for signs of damage and rust all along the brake pipe. If present, replace with a brake pipe of the same type, size, length, and shape.

Brake lining: If a lining has worn to a thickness of 1.0 mm replace the brake pad or brake shoe. Check for heat cracks, scoring and any damage to friction material.

Brake calliper: Check the caliper securing bolts torque setting; re-torque to manufacturer's specifications as necessary. Check for leaks in the caliper housing and caliper seals.

If the caliper is distorted or damaged or if the cylinder bores are excessively worn replace the caliper. Inspect the caliper guides for ease of movement

Brake hose (flexible): Check for signs of softening, cracking, leaks and abrasions. If any of these symptoms are present replace the brake hose.

10. Describe the overhaul procedure, including removing and replacement of a brake master cylinder.

Remove master cylinder from booster. Disassemble and strip the master cylinder, laying out components following a diagram. Following the disassembly procedure, components that can be replaced and components to be lubricated in the assembly are to be inspected. Aluminium master cylinders should not be honed as honing will remove the wear resistant coating from the bore. Cast iron master cylinders may be honed or re-sleaved depending on the piston to bore clearance. Consideration should always be made with regards to cost of repair against cost of replacement. Reassemble the master cylinder in reverse order of disassembly taking care not to damage anything. Bench bleed master cylinder and inspect. Refit to vehicle and bleed brake system.

11. Outline the procedure for overhauling a disc brake assembly.

Remove the disc pads and anti-rattle springs from the calliper assembly. Mount the brake calliper in a vice and remove the calliper piston dust boot. Using a compressed air gun apply light air pressure to the brake fluid inlet port until the piston is forced from the calliper bore. Inspect the piston for corrosion or damage and replace if necessary. Remove the piston sealing ring from the calliper housing and inspect for cuts, splits and brittleness. Replace the seal if any of these conditions exist. Clean all parts with methylated spirits and wipe dry with a lint free cloth. Using an air gun blow out the drilled passages in the calliper housing. Dip the new piston seal in clean brake fluid and install the seal into the caliper housing seal groove. Apply finger pressure to the seal to ensure the seal is correctly seated into the groove.

Coat the calliper piston in the rubber grease and place the new dust boot over the rear end of the piston.

Coat the inside of the calliper bore with approved grease or brake fluid and place the rear end of the piston into the calliper bore.

Apply finger pressure onto the piston until the piston is inserted fully into the caliper bore, press fit the dust boot onto the calliper housing.

Lubricate the calliper slides, sleeves and bushes with approved high melting point grease. Assemble the new disc pads, mount the calliper over the disc rotor and secure the calliper mounting bolts. Attach the brake hose to the calliper with a new copper washer. Inspect disc rotor for wear, cracks and any damage. If necessary machine rotors. Prepare the vehicle for brake bleeding.

12. Outline the procedure for overhauling a drum brake assembly.

Inspect the brake shoes for excessive lining wear or shoe damage. If the lining is worn to 0.8 mm of the rivet heads or shoe for bonded brakes or if the shoes are damaged, they must be replaced. Prior to replacement of the lining, the drum diameter should be checked to determine if oversize linings must be installed.

When replacing brake shoes, ensure that both axle pairs are replaced to enable equal braking efficiency to be maintained.

Check the condition of the brake shoes, retracting springs, and drum for signs of overheating. If the shoes have a slight blue colouring, or if the springs show a change in free length, indicating overheating, replacement of the retracting and hold down springs is necessary. Overheated springs lose their tension and could cause the new lining to wear prematurely if they are not replaced.

If the vehicle has 50,000 km or more of operation on the brake linings or signs of overheating are present when relining brakes, the wheel cylinders should be disassembled and inspected for wear and dirt in the cylinder. The cylinder cups and other parts contained in the overhaul kit should be replaced, thus avoiding future problems.

Inspect the brake drums and if necessary, refinish.

Clamp the rear brake hose with a brake hose clamp. This will prevent the wheel cylinder pistons from creeping and falling out the wheel cylinder once the brake spring and brake shoes have been removed.

Identify the leading brake shoe (brake shoe closest to the front of the vehicle) and remove the top and bottom return springs from the leading shoe grooves.

Remove the brake shoe retaining spring clip and pin and remove the leading shoe.

Remove the brake adjuster and handbrake lever linkage.

Remove the trailing shoe spring retaining spring clip and pin.

Disassemble the hand brake lever from the trailing shoe and remove the shoe.

Inspect the wheel cylinder assembly for fluid leaks or damage. If a leak or damage is evident, the wheel cylinder will need to be overhauled with a new kit or replaced. If the wheel cylinder assembly does not require service, proceed with the brake shoe replacement.

Ensure that the backing plate is secured to the axle.

Assemble the hand brake lever to the trailing shoe.

Release the brake adjuster and back off the handbrake cable adjuster.

Apply a light coating of high temperature grease at the points where the brake shoes contact the backing plate to prevent brake shoes rubbing against the backing plate.

Align the trailing shoe with the wheel cylinder and brake shoe anchor.

Inspect all brake springs, replace brake springs that stretched, broke, or deformed.

Install the trailing shoe spring retaining clip and pin to secure the trailing shoe to the backing plate.

Install the hand brake link and spring to the trailing shoe.

Align the leading shoe with the wheel cylinder, brake shoe anchor and the hand brake link.

Install the leading shoe spring retaining clip and pin to secure the leading shoe to the backing plate.

Using the recommended tool, install the top and bottom brake shoe return springs.

Release the brake hose clamp. Prepare and fit the brake drum.

13. Outline the procedure for overhauling a handbrake mechanism.

Check the security of the hand brake lever and cables. Check return springs, inner and outer cables, linkages, pivots and brakes shoes for damage, wear, corrosion and miss alignment. Repair any faults found to manufacturers specifications, adjust brake shoe/pad to drum/disc clearance then finally adjust handbrake cable to set lever height.

14. Explain why you would replace a flexible brake hose or brake pipe and how you would carry out that repair or replacement.

A flexible brake hose should be replaced if it shows signs of softening, cracking, leaks, abrasions or deformation.

Flexible brake hose replacement

1. Disconnect the metal pipe fitting from the brake hose and plug the metal pipe flare to prevent fluid loss.

2. Remove the flexible hose retaining clips from the hose mounting brackets.
3. Disconnect the flexible hose from either the brake caliper or other metal brake pipe fittings.

To install a flexible brake hose

1. Position the brake hose into its mounting brackets and secure the retaining clips.
2. Using a holding spanner and flare nut spanner. Secure both ends of the connectors.
3. Ensure the flexible hose is positioned to avoid contact with the chassis and is not tension with the movement of the suspension.
4. Bleed brakes.

15. Explain the testing procedure for a brake booster?

Run the engine for one or two minutes, and then stop it. Depress the brake pedal several times at normal foot pressure. If the pedal goes down further at the first time, but gradually rises after the second or third time, the brake booster is functioning properly.

With the engine stopped, depress the brake pedal several times. Depress the brake pedal and start the engine. If the pedal goes down slightly, the booster is in good condition.

With the engine running, depress the brake pedal and then stop the engine. Hold the pedal depressed for 30 seconds. If the pedal height does not change, the booster is in good condition.

16. Explain the procedure to overhaul or replace a brake booster.

Remove vacuum hose and check valve assembly from brake booster. Remove brake master cylinder mounting bolts from booster and being careful not to damage hydraulic pipes move master cylinder away to the side so as to clear vacuum booster.

Remove brake booster mounting bolts in passenger's foot well and disconnect brake pedal clevis pin from brake booster pushrod.

Carefully remove booster away from firewall.

Do not attempt to dismantle booster unless the correct tools are available as the booster contains a heavy spring under tension which can be a safety issue.

A second hand unit can be sourced or booster given to a qualified repairer for repair.

Refit repaired booster to firewall and attach brake pedal pushrod to pedal.

Refit master cylinder assembly to booster and then vacuum hose.

Test vacuum booster operation before road testing vehicle.