



**higher education  
& training**

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

# **MARKING GUIDELINE**

**NATIONAL CERTIFICATE**

**APRIL EXAMINATION**

**DIESEL TRADE THEORY N2**

**APRIL 2016**

This marking guideline consists of **5** pages.

**QUESTION 1**

- 1.1.1 False
- 1.1.2 True
- 1.1.3 True
- 1.1.4 False
- 1.1.5 False
- 1.1.6 False
- 1.1.7 True
- 1.1.8 False
- 1.1.9 False
- 1.1.10 True

(10 x 1) (10)

- 1.2.1 A Insert or shift plate
- B Outer sleeve
- C Dog gear/Teeth
- D Insert spring
- E Inner hub

(5)

- 1.2.2 The driver pull the gearlever with the fork,✓ which shifts the outer sleeve away from the dog gear of the third idler gear to neutral position.✓ The driver then pulls the lever towards forth gear which moves the fork and outer sleeve towards the main drive gear.✓ The synchroniser blocking ring slides up the synchro cone which starts a clutch action to synchronise the speed of the main drive gear and the main shaft.✓ When the speed is equal the outer sleeve slips across the dog teeth of the main drive gear.✓

(5)

*ANY OTHER RELEVANT ANSWER***[20]****QUESTION 2**

2.1

ADVANTAGES	DISADVANTAGES
1) Brake system operates quickly and reliably.✓	1) Leakage of brake fluid at any point render system inoperative.✓
2) The resulting braking effect is in proportion to the effort applied (force on pedal).✓	2) Leakages of brake fluid at wheel cylinders will saturate the brake linings which warrant the replacement of the linings.✓
3)The pressure exerted throughout the system is the same at any point in the system.✓	3) Air in the system decreases the efficiency and may cause brake failure.✓
4) No adjustment required with disc brakes.✓	4) Level of brake fluid in reservoir must be checked regularly.✓

*ANY OTHER RELEVANT ANSWER*

(8)

- 2.2 Make sure that you have sufficient brake fluid and ensure that the brakes are adjusted correctly. ✓ Determine if the master cylinder is fitted with a return valve. ✓ If the master is fitted with a bleeding nipple, air must first be bled from the master cylinder. ✓ Connect a bleeding pipe to the bleeding nipple furthest from the master cylinder with the free end of the pipe immersed in a glass jar filled with brake fluid. ✓ When a return valve is fitted to the master cylinder the bleeding nipple is opened and the brake pedal is repeatedly applied and released slowly until no air bubbles are discharged through the bleeding pipe. ✓ The bleeding nipple is then closed with the brake pedal in the applied position. ✓ When no return valve is fitted the brake pedal is first applied and only then is the nipple opened. The bleeding nipple is again closed before the brake pedal is released. The procedure is repeated until no air bubbles are discharged through the bleeding pipe. ✓ Repeat the procedure as you work your way closer to the brake master cylinder. ✓

*ANY OTHER RELEVANT ANSWER* (8)

- 2.3
- A swollen primary washer closing off the relief port in the brake master cylinder.
  - Dirt preventing the piston in the brake master cylinder from returning to the released position.
  - No or little brake pedal free play.
  - A blocked relief port.
  - Pipes that is pinched or nicked.

*ANY FOUR/ANY OTHER RELEVANT ANSWER* (4)  
[20]

### QUESTION 3

- 3.1.1 A Casing (Outer hub)  
B Dust cover/Rubber boot/boot  
C Cage  
D Steel ball  
E Inner hub (Ball) (5)

- 3.1.2 CV joint/constant velocity joint (1)

- 3.1.3
- CV joint turns at a constant speed, it is smoother in operation with less vibrations and kick-back reactions at the steering when cornering.
  - CV joints can operate through a larger range of angles where large-angle steering movements are made.
  - The inner cv joint acts like a slip joint in a drive shaft for a rear wheel drive vehicle.
  - It allows for lateral movement of the drive shaft as the wheels move up and down.
  - CV joints are protected from road dirt and water by a CV joint rubber boot providing the rubber boot is not damaged or torn.

*ANY FOUR/ ANY OTHER RELEVANT ANSWER* (4)

- 3.2.1 A Seal  
B Air space  
C Reservoir  
D Rebound valve (Piston valve)  
E Base rebound and bump valve (5)
- 3.2.2 When the wheel moves over a speed bump it compresses the suspension, ✓  
the shock absorber become shorter. ✓ The piston compresses the oil in the  
bottom cylinder and a vacuum forms in the top cylinder. ✓  
Oil is released slowly through the piston valve to the top cylinder ✓ and slowly  
through the relief valve to the reservoir. ✓ (5)  
*ANY OTHER RELEVANT ANSWER [20]*

**QUESTION 4**

- 4.1 Steering boxes must be adjusted within narrow limits to ensure that they work  
to optimal effect. (1)
- 4.2.1 • Adjusting end-play of the steering-wheel shaft  
• End-play of the sector shaft  
• Backlash between gears (3 x 1) (3)
- 4.2.2 • End-play of the steering-wheel shaft – This play is adjusted by means of  
shims or an adjusting screw and lock nut. ✓ The play is tested by means of  
a pull scale on the steering wheel to set a slight preload as per  
specifications. ✓  
• End-play of the sector shaft – This play is adjusted by means of shims or  
an adjusting screw and lock nut. ✓ The play is tested by means of a dial  
gauge fitted on the end of the shaft and the sector shaft-end float is set to  
specifications. ✓  
• Backlash between gears – This is set by means of a cam action device,  
depending on the design. ✓ Can also be tested by a pull scale or torque  
wrench on the steering wheel as per specifications. ✓ (3 x 2) (6)
- 4.3.1 • Incorrect clutch adjustment.  
• Binding clutch cable or linkage  
• Worn or damaged synchroniser unit.  
• Low gearbox oil level.  
• Engine idle speed too high.  
• Worn shafts, bearings, selector rods or selector fork inside the  
gearbox.  
*ANY THREE ANY OTHER RELEVANT ANSWER (3)*
- 4.3.2 • Output shaft rear bearing worn or broken.  
• Gear badly worn or chipped gear teeth.  
• Excessive end play on the main shaft.  
*ANY OTHER RELEVANT ANSWER (3)*

- 4.4
- A light tubular drive shaft can be used.
  - Construction is simple and cheap.
  - The gearbox can be easily removed.
  - Replacements of the universal joints are easy.
- (4 x 1) (4)  
**[20]**

**QUESTION 5**

- 5.1
- (a) Single hole
  - (b) Multi-hole
  - (c) Pintle
  - (d) Pintaux
- (4 x 1) (4)
- 5.2
- It must maintain even viscosity (thickness) throughout a wide temperature variation and must not freeze in the coldest temperatures.
  - The boiling point of brake fluid must be above the highest operation temperature of the brake system parts (145 degrees).
  - Brake fluid should be hygroscopic to prevent internal freezing of parts.
  - It must lubricate pistons, seal and cylinders to reduce wear and friction.
  - Brake fluid should not corrode the metal parts or deteriorate the rubber parts.
- ANY THREE\ANY OTHER RELEVANT ANSWER* (3)
- 5.3
- Swirl chamber  
Pre-combustion chamber  
Energy cell or air cell
- (3)
- 5.4
- A Fuel tank
  - B Gauze filter
  - C Primary filter
  - D Fuel delivery pump
  - E Primer pump
- (5)
- 5.5
- Curb height indicates the height of a vehicle without passengers, but with a full fuel load in the tank✓. The curb height is measured from the ground surface to a specified location on a vehicle's undercarriage.✓  
Curb mass of a vehicle is the full operating mass of the vehicle✓ and includes the lubrication oil, coolant and a full fuel tank, the spare wheel, jack and handle should be in the designed position.✓ Some vehicle manufacturers require a drive behind the steering wheel.✓
- (5)  
*ANY OTHER RELEVANT ANSWER* [20]

**TOTAL: 100**