higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

DIESEL TRADE THEORY N2

9 April 2021

This marking guideline consists of 6 pages.

QUESTION 1

1.1 D
1.2 A
1.3 C
1.4 C
1.5 B
1.6 D
1.7 A
1.8 A
1.9 B
1.10 B

(10 × 1) **[10]**

QUESTION 2

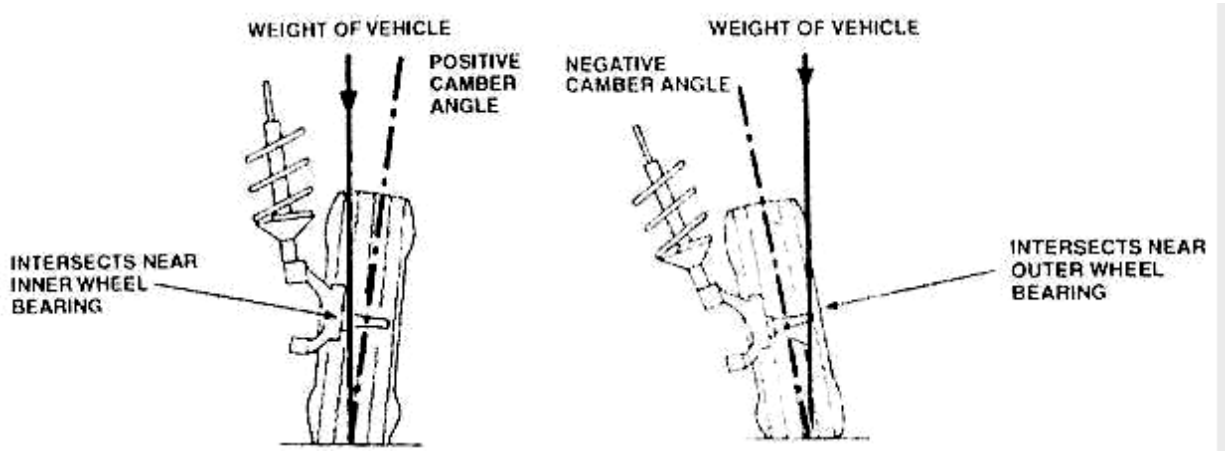
2.1 True
2.2 True
2.3 False
2.4 True
2.5 False

(5 × 1) **[5]**

QUESTION 3

3.1
- The curb height is the height of a vehicle without passengers but with a full fuel tank.
- It is measured from the ground surface to a specified point on a vehicle's undercarriage. (2)

3.2



(Sketches – 2 marks per sketch) (2 × 2)
(Labelling – 1 mark per sketch) (2 × 1) (6)

3.3
- If the wheel alignment is not set accurately, the vehicle would be dangerous✓ to handle at higher speeds. ✓
- There will be excessive tyre wear if the wheel alignment is not set properly.✓ Correct wheel alignment is essential for good road-holding and safety when driving.✓
- Improper alignment can cause hard steering,✓ wandering, noise and can result in the vehicle pulling to the one side.✓
- Maximum fuel economy would not be possible, as the wheels would exert extra frictional force✓ due to scuffing, slipping and dragging under operating conditions.✓ (4 × 2) (8)

3.4
A Sector shaft gear
B Worm shaft
C Ball guides
D Worm
E Ball nut
F Sector shaft (6 × 1) (6)

[22]

QUESTION 4

4.1
- Good acceleration from rest by selecting a suitable gear ratio
- Neutral so that the vehicle can come to a stop with the engine running
- Good hill-climbing ability by selecting a suitable gear ratio
- A gear ratio that allows the vehicle to move at a slow pace
- Allows for forward and reverse movement without changing the engine's normal direction of rotation
- Increases engine torque in stages
- Increases the leverage of the engine over the driving shaft (Any 4 × 1) (4)

4.2 4.2.1
- Misalignment between the engine and gearbox
- Improper adjusting of shaft linkage
- Worn clutch pilot bearing
- Worn synchroniser shift plates (insert) and spring
- Defective locking mechanism (Any 2 × 1)

4.2.2
- Low oil level in gearbox
- Abnormal end play in counter shaft gear
- Input shaft gear badly worn or broken (Any 2 × 1)

4.2.3
- Too much oil in the gearbox
- Damaged or ruptured gaskets or oil seals
- Cover bolts loose
- Damaged or cracked housing and covers (Any 2 × 1)

(3 × 2) (6)

4.3
- Input shaft
- Cluster gear
- First gear
- Synchro sleeve
- Synchro hub
- Main shaft (6)

4.4
- It prevents gears from grinding or clashing during engagement.
- It locks in position the output gear selected to the output shaft.
- It synchronises the speed of the gear prior to selection. (Any 2 × 1) (2)

[18]

QUESTION 5

5.1
- Fixed callipers (dual piston)
- Moving or floating callipers (single piston) (2)

5.2
- Largely self-adjusting.
- Easy to replace disc brake pads.
- Easy and simple inspection of disc.
- Exposed disc allows pad dust to be blown away.
- Exposed disc promotes good cooling.
- Leaking brake fluid does not easily come in contact with the brake disc. (Any 2 × 1) (2)

5.3
- Connect a bleeding pipe to the bleeding nipple, furthest from the master cylinder, with the free end of the pipe submerged in brake fluid in a glass jar.
- When a return valve is installed,
- the bleeding nipple is opened and the brake pedal is repeatedly and slowly applied and released until no air bubbles are seen through the discharge bleeding pipe.
- The bleeding nipple is closed when the brake pedal is kept applied.
- When no return valve is installed,
- the brake pedal is first applied and only then the bleeding nipple is opened. The bleeding nipple is again closed before the brake pedal reaches the end of its travel.
- The procedure is repeated until no air bubbles are seen in the discharge bleeding pipe. (7)

5.4
A Disc brake callipers
B Master cylinder
C Brake booster/vacuum brake servo unit
D Brake pedal
E Backing plate/drum brake
F Hand/park brake compensator (6 × 1) (6)

5.5 Its function is to allow each wheel actuator to receive equal force irrespective of the lining, joint or cable wear. (1)

5.6
- Vacuum from the intake manifold is applied to the spring inside the diaphragm. The pressure difference causes the diaphragm to move against the spring tensioner.
- The piston applies compressive force to the piston rod, thereby closing that piston rod against the diaphragm, closing the port in the slave cylinder. Further movement of the diaphragm causes pressure to build up in the slave cylinder. (2)

[20]

QUESTION 6

6.1
- The planetary gears rotate slowly about the differential shaft
- and roll around the inner side gear.
- The rotary movement of the planet gears around the differential shaft causes them to drive the outer side gear at an increased speed,
- which is more than that of the differential carrier.
- The gain of the rotational frequency (spinning) of the outer wheel is equal to the loss of the rotational frequency of the inner wheel. (5)

6.2 Dial gauge (1)

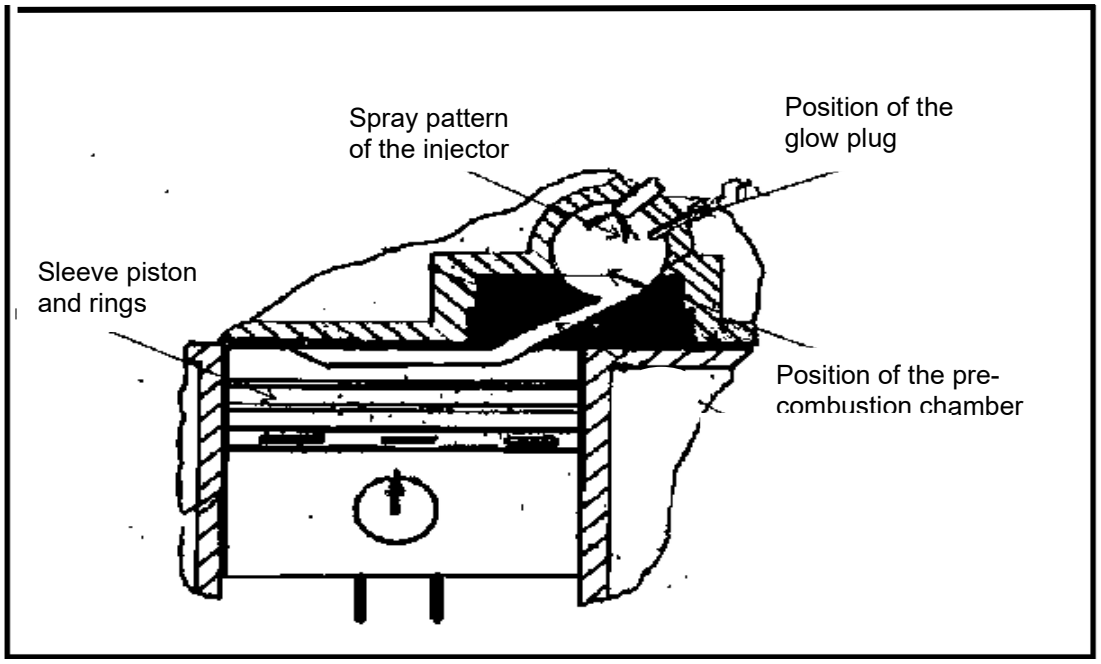
6.3
- It acts as a link between two drive shafts that are not in line with each other,
- to accommodate the change in angularity in conjunction with the drive shafts. (2)

6.4
- In the direct injection combustion chamber, fuel is injected directly into the closed end of the cylinder.
- In indirect injection, the air is pumped through a hot throat and set in a high state of swirl in the precombustion chamber. Fuel is then injected in the form of spray. (2)

6.5
- It forms a gastight seal preventing leakage of pressure during compression and combustion.
- It prevents the combustion temperature from reaching the injector unit by conducting the heat away from the injector to the cylinder head and cooling water.
- It provides the means to obtain the correct depth for the injector nozzle in the combustion chamber. (Any 2 × 1) (2)

6.6
- The pressure at which the injector operates must be high✓ to blow away or clean any carbon deposit that might block the injector nozzle.✓
- The injector must atomise fuel as thoroughly as possible✓ and deliver the correct spray pattern at all times. ✓
- The injector must inject atomised fuel with sufficient penetration✓ into the combustion chamber.✓
- It injects the atomised fuel in the direction✓ of the required section of the combustion chamber.✓ (4 × 2) (8)

6.7



(1 mark for sketch)
(1 mark for each label) (4 × 1) (5)
[25]

TOTAL: 100