higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

DIESEL TRADE THEORY N2

30 JULY 2018

This marking guideline consists of 5 pages.

QUESTION 1

1.1 A – Single-hole
B – Multihole
C – Pintle
D – Pintaux (4 × 1) (4)

1.2
- Break up the stream of injected fuel into minute droplets
- Inject fuel into the compressed air in the combustion chamber with sufficient penetration to form a combustible mixture (2)

1.3
- It forms a gastight seal to prevent leakage of pressure during compression and combustion.
- It prevents 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 correct depth for the injector nozzle in the combustion chamber. (Any 3 × 1) (3)

1.4
- Has a longer life
- Is reliable
- Has a lower fire hazard
- Lower fuel consumption
- Less maintenance costs
- No radio interference
- Higher thermal efficiency (Any 6 × 1) (6)

1.5
- The inline multi-pumping element type
- The distributor single-element type (DPA pump) (2)

1.6 1.6.1 It transfers fuel from the tank √ to the fuel inlet connection on the injector pump.√ (2)

1.6.2 They serve as a heating element √ that warms the air in a precombustion chamber to help start a cold diesel engine. √ (2)

1.6.3 They allow carefully controlled fuel seepage between the injector nozzle and needle to provide lubricants for the sliding pair√. The fuel is returned to the tank.√ (2)

[23]

QUESTION 2

2.1
2.1.1 B
2.1.2 C
2.1.3 A
2.1.4 E
2.1.5 F
2.1.6 D (6)

2.2
A – Gearbox/transmission
B – Propeller shaft
C – Rear-axle assembly/ housing
D – Front universal joint
E – Rear universal joint
F – Slip joint (6)

2.3
2.3.1 A slip joint allows for the change in length of the propeller shaft.

2.3.2 The Hooke's type universal joint transmits drive through varying angles.

(2 × 1) (2)

2.4
- It reduces vibration at high revolutions.
- It reduces the risk of sagging and whipping at high speeds.
- It helps to maintain the same torsional circumferential stress per length.

(Any 2 × 1) (2)

2.5
- It allows the outer wheel to rotate faster than the inner wheel during turning.
- It delivers the same amount of torque to each wheel irrespective of their relative speeds of rotation. (2)

2.6
A – Inner hub
B – Gear wheel
C – Baulk ring/synchronizing ring
D – Outer sleeve
E – Gear wheel (5)

2.7
- Prevents the gears from grinding or clashing during engagement
- Locks the output gear to the output shaft
- Synchronises the speed of the gears prior to selection (Any 2 × 1) (2)

[25]

QUESTION 3

3.1 A – Spring eye
B – Centre bolt
C – Rebound clip (3)

3.2 3.2.1
- The centre bolt holds the leaves together.
- It locates the leaf spring to the axle. (Any 1 × 1) (1)

3.2.2 The swinging shackle allows for the change in length of the leaf spring (1)

3.2.3
- Rebound clips keep the leaves in alignment during rebound.
- They distribute the load during rebound and hence protect the main leaf from breaking. (Any 1 × 1) (1)

3.3 A – Housing
B – Inner race
C – Clamp
D – Balls
E – Boot
F – Cage (6)

3.4
- Smoother operation with less vibration and kickback at the steering wheel
- Can operate through larger range of angles
- Inner CV joints are like slip joints
- Protected from dirt and water by rubber boots (Any 2 × 1) (2)

[14]

QUESTION 4

4.1 A – Steering gearbox
B – Track rod
C – Steering arm
D – Stub axle
E – Beam axle
F – Ball joints (6)

4.2 4.2.1 Camber - outward or inward tilt of the wheel at the top from the vertical

4.2.2 Included angle - camber plus kingpin inclination

4.2.3 Toe-out on turns - when the inner wheel turns at a sharper angle than the outer wheel as a result of Ackermann' s principle

(3 × 2) (6)

[12]

QUESTION 5

5.1 A – Disc brake/brake caliper
B – Master cylinder
C – Brake booster/vacuum servo
D – Brake pedal
E – Back plate/drum brake
F – Handbrake compensating mechanism (6)

5.2 5.2.1 Component C minimises the driver's effort on the brake pedal.

5.2.2 Component F ensures that the same amount of pull is felt on each wheel when the handbrake is applied.

(2 × 1) (2)

5.3 A – Reservoir /brake fluid
B – Pushrod/Activator
C – Piston
D – Primary cup
E – Return spring
F – Check valve (6)

5.4
- It keeps pressure in the brake pipes to prevent the entry of air and dirt into the brake system.
- It keeps the pedal free travel to a minimum.
- It keeps the wheel cylinder seal lips in light contact with the cylinder bore to avoid entry of air or leakage past the seals.
- It prevents the re-entry into the master cylinder of fluid pumped into the line during the bleeding operation. (Any 2 × 1) (2)

[16]

QUESTION 6

6.1 D
6.2 A
6.3 C
6.4 C
6.5 A
6.6 C
6.7 B
6.8 D
6.9 B
6.10 D

(10 × 1) **[10]**

TOTAL: 100