higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

DIESEL TRADE THEORY N3

14 April 2020

This marking guideline consists of 6 pages.

QUESTION 1

1.1 E
1.2 G
1.3 A
1.4 K
1.5 F
1.6 H
1.7 C
1.8 D
1.9 L
1.10 J

(10 × 1) **[10]**

QUESTION 2

2.1 True
2.2 False
2.3 False
2.4 True
2.5 True
2.6 True
2.7 False
2.8 True
2.9 False
2.10 True

(10 × 1) **[10]**

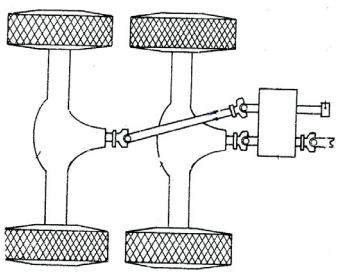
QUESTION 3

3.1 3.1.1 A – Planetary gears
B – Cone clutch
C – Sun gear
D – Annulus, ring gear
E – One-way clutch (5)

3.1.2 Overdrive
The cone clutch is engaged with the casing. (2)

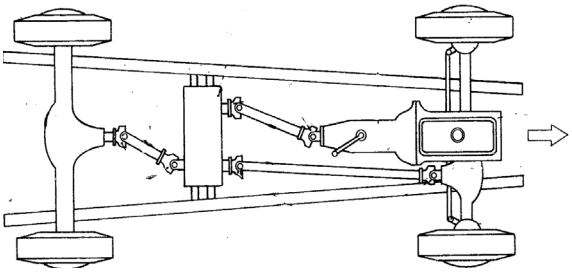
3.1.3 main shaft (Inlet shaft); planetary carrier; planetary gears; ring gear; output shaft (4)

3.2 3.2.1



(2)

3.2.2



(2)

3.3
- Compact
- Light
- Number of gear ratios
- Strong drive unit
- Silent and easy gear change (Any 3 × 1) (3)

3.4
- Changes direction of flow of oil by ninety degrees
- Accelerates oil flow (2)

(Any other possible answer is allowed) **[20]**

QUESTION 4

4.1

$$Cr = \frac{Vs + Vc}{Vc}$$

$$Cr \times Vc = Vs + Vc$$

$$Vs = Vc\,(Cr - 1)$$

$$= 205\,(16 - 1)$$

$$= 3075cm^3$$

$$Vs = \frac{\pi d^2}{4} \times Ls$$

$$\frac{Vs}{Ls} = \frac{\pi d^2}{4}$$

$$D = \sqrt{\frac{4 \times Vs}{\pi \times Ls}}$$

$$= \sqrt{\frac{4 \times 3075}{\pi \times 10.5}}$$

$$= 19.31cm$$

(8)

4.2

$$N = 1 - \left[\frac{1}{R}\right]^{0.4}$$

$$0,6 = 1 - \left[\frac{1}{R}\right]^{0,4}$$

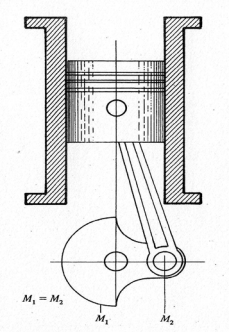
$$1 - 0,6 = \left[\frac{1}{R}\right]^{0,4}$$

$$R = \frac{1}{0,4^{2.5}}$$

$$= 9.882:1 \quad (4)$$

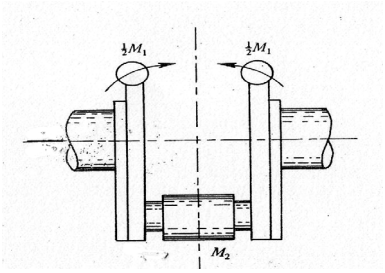
4.3
- Blown cylinder head gasket
- Exhaust or intake manifold blocked
- Valves worn or burned
- Valve clearance too small
- Weak or worn-out valve springs
- Worn-out pistons and rings
- Cracked piston
- Carbon on the valve face or seat (Any 4 × 1) (4)

4.4 4.4.1



(2)

4.4.2



(2)
[20]

QUESTION 5

5.1 5.1.1 A – Governor spring
B – Accelerator lever
C – Rack
D – Centrifugal weight
E – Sleeve (5)

5.1.2 The accelerator lever (B) supplies maximum pressure to the governor spring (A). The engine speed is low and the centrifugal force of the weights (D) is low. The spring (A) forces the rack (C) in maximum delivery position. The pump deliver maximum diesel to pull the vehicle up the incline (5)

5.2
- Mount the pump to a test bench. Connect the pipes and bleed the system properly. Connect the plunger outlets to the test injectors of the machine.
- Lock the rack in the prescribed delivery position.
- Adjust the rev-counter to the prescribed specifications.
- Switch on the machine and note the quantity delivered in the test tubes.
- If the delivery is too much or not enough, adjust the quadrant and retest until each plunger delivers the same quantity according to specifications.
- Retest the pump to different rack positions. (6)

5.3
- The torque converter is more effective than the fluid coupling at low speed due to torque multiplication.
- Less slip occurs at the torque converter.
- Due to the curved vanes of the torque converter it provides better acceleration.
- The stator in the torque converter changes the direction of the returning oil to the rear of the pump fins to prevent resistance.
- Torque multiplication takes place automatically in the torque converter.

(Any 4 × 1) (4)
[20]

QUESTION 6

6.1
- Ensures that repairs and services have been carried out correctly
- Picks up defective workmanship
- Diagnostic equipment used where necessary
- Road test necessary after car has been repaired
- Dynamometer used for tests after repairs

(Any other possible answer is allowed)(5 × 1) (5)

6.2
- Information accurately stored and retrieved
- Generates quotes for repairs
- Staff cost easily calculated
- Availability of spares easily determined
- Costs quickly calculated
- Reports stored and retrieved
- Human errors reduced (Any 5 × 1) (5)

6.3 6.3.1
- Date of purchase
- Price
- Number purchased
- Name of supplier (4)

6.3.2 Annually (1)

6.3.3
- Checked against a register
- Condition of tools checked at the same time
- Tools in bad condition replaced

(Any other possible answer is allowed) (3)

6.4
- The receptionist/manager normally deals with the customer and should have the job card for easy access.
- The receptionist/manager controls the flow of the job card and records the parts and labour on the job card. (Any other possible answer is allowed) (2)

[20]

TOTAL: 100