



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

DIESEL TRADE THEORY N3

10 APRIL 2018

This marking guideline consists of 6 pages.

QUESTION 1

$$\begin{aligned}
 1.1 \quad V_s &= V_c (C_r - 1) \checkmark \\
 &= 8\,500 (10 - 1) \checkmark \\
 &= 76\,500 \text{ mm}^3 \checkmark
 \end{aligned}$$

$$V_s = \frac{\pi D^2}{4} \times L_s$$

$$D^2 = \frac{V_s \times 4}{\pi \times L_s} \checkmark$$

$$= \frac{76\,500 \times 4}{\pi \times 105}$$

$$D = 30,457 \text{ mm} \checkmark$$

(5)

$$1.2 \quad N = 1 - \left(\frac{1}{R} \right)^{0,4} \checkmark$$

$$0,62 = 1 - \left[\frac{1}{R} \right]^{0,4} \checkmark$$

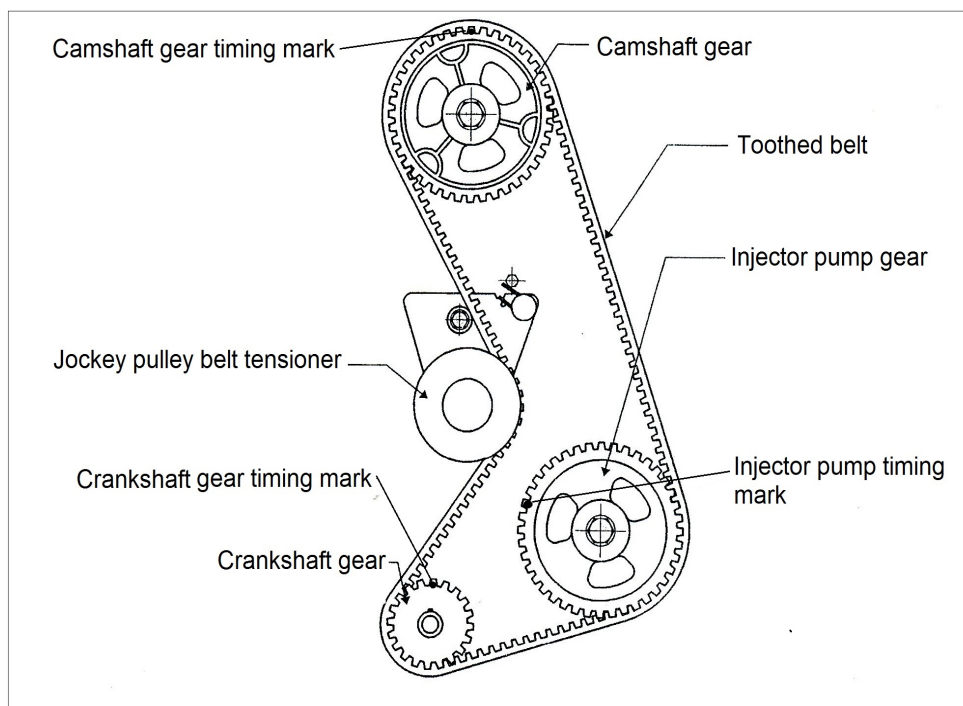
$$1 - 0,62 = \frac{1}{R} \checkmark$$

$$2,632 = R$$

$$R = 11,239 : 1 \text{ OR } 11 : 1 \checkmark$$

(4)

1.3



(8)

- 1.4 The belt is not strong.
Oil spilling causes the belt to stretch and jump teeth.
The belt should be replaced regularly according to maintenance instructions.
No warning indication when the belt is fractured (chain makes a noise).
Cold start instantaneously loads the belt and can cause the belt to jump teeth.
(ANY THREE/ANY OTHER RELEVANT ANSWER) (3)
[20]

QUESTION 2

- 2.1 Alternating forces
Opposing masses
Elasticity of the crankshaft (3)
- 2.2 Prevent the building up of carbon between the valve seat and the valve face.
Helps to maintain an even valve temperature.
Valve stem is kept free from carbon deposits
Extend the life of the valve and its seat
Reduce the tendency of valve burned (5)
- 2.3 It removes the carbon between the valve and the seat.
It provides a better seal between the valve and the seat. (2)
- 2.4 The accelerator pulls the rack towards maximum delivery position ✓ and the quadrant rotates the control sleeve anti-clockwise. ✓ The control sleeve rotates the shoulder and plunger anticlockwise. ✓ The helix ends up in a longer delivery position against the spill port. ✓ More diesel is injected which leads to higher engine revolutions. ✓ (5)
- 2.5 Valves will not close properly
Loss of pressure in the cylinder
Valves will burn away
Engine will overheat
Incomplete filling of the cylinder
High fuel consumption
Low volumetric efficiency
Loss of power (5)
(ANY FIVE/ANY OTHER RELEVANT ANSWER) **[20]**

QUESTION 3

- 3.1 A – Ring gear or annulus
B – Planetary gear
C – Planetary carrier
D – Sun gear (4)
- 3.2 The set is compact and small.
It is lightweight.
The epicyclic set provides numerous gear ratios.
The gear set changes gears smooth and silent.
Constant mesh reduces wear on gear teeth.
Gear change takes place automatically.
(ANY FOUR/ANY OTHER RELEVANT ANSWER) (4)
- 3.3 A – Turbine
B – Pump
C – Stator
D – One-way clutch
E – Gearbox extension housing (5)
- 3.4 The pump throws the oil outwards, inwards and in the line of rotation.✓
The oil strikes the turbine which starts to rotate.✓ The dead oil from the turbine strikes the stator which changes the direction of the oil by 90°✓ to the rear of the pump fin✓ and accelerates the oil.✓ (5)
- 3.5 Revolutions of the engine are lower
Engine last longer
Saves fuel
Provides more gear ratios (2)
(ANY TWO/ANY OTHER RELEVANT ANSWER) **[20]**

QUESTION 4

- 4.1 4.1.1 compression ignition engines
4.1.2 fuel injection pump
4.1.3 injectors
4.1.4 crank shaft
4.1.5 cam shaft
4.1.6 half (6)
- 4.2 4.2.1 E
4.2.2 F
4.2.3 D
4.2.4 A
4.2.5 C (5)

- 4.3 Turn the engine before TDC according to timing marks and disconnect number one injector pipe. Remove number one delivery valve and fit the spill pipe and slacken the pump. Pump the low pressure lift pump while adjusting the injector pump until the fuel stops flowing Tighten injector pump, refit delivery valve and number one injector pipe.
(ANY OTHER RELEVANT ANSWER) (4)
- 4.4.1 To prevent large dirt particles from entering the fuel system (1)
- 4.4.2 To prevent fine dirt particles from entering the fuel system (1)
- 4.4.3 Prevent water from entering the fuel system (1)
- 4.5 To serve as a coolant (2)
To serve as a lubricant [20]

QUESTION 5

5.1

Limited slip differential	Conventional differential
Clutch plates	None
Friction discs	None
Tapered planetary shafts.	Straight planetary cross shaft
Planetary shaft in two halves.	Single planetary shaft
Taper opening in carrier.	Straight opening in carrier
Pressure plate behind sun gear.	Thrust washers behind sun gear

(ANY FIVE/ANY OTHER RELEVANT ANSWER) (5)

- 5.2 Must be near the main road
Must be visible
Entrance to main road without one-way traffic
Prevent inclines
Availability of municipality services
No opposition nearby
(ANY FIVE/ANY OTHER RELEVANT ANSWER) (5)

- 5.3 5.3.1 The receptionist must allow the customer to explain his dissatisfaction. Do not contradict the customer, stay calm and show interest in the problem. Offer solutions that the customer understands and agrees to.
(ANY OTHER RELEVANT ANSWER) (4)

- 5.3.2 Draw the job card to see what repairs should be carried out.
Ensure that the vehicle is Road-tested, to make sure what must be repaired.
Ensure Repairs to the vehicle as soon as possible.
Phone the customer to make sure he/she is satisfied with the repairs to his vehicle.
When possible offer the customer a courtesy vehicle.

(ANY OTHER RELEVANT ANSWER) (4)

- 5.4 A signature makes the transaction legal.✓
Permission is granted for a road test and it forces the customer to pay✓
The signed job card allows the repairs to be carried out.✓

(ANY TWO/ANY OTHER RELEVANT ANSWER) (2)
[20]

TOTAL: 100