



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE DIESE TRADE THEORY N3

25 November 2022

This marking guideline consists of 5 pages.

SECTION A**QUESTION 1**

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

(10 × 1) [10]

QUESTION 2

- 2.1 False
- 2.2 False
- 2.3 True
- 2.4 True
- 2.5 True

(5 × 1) [5]

QUESTION 3

- 3.1 L
- 3.2 E
- 3.3 H
- 3.4 F
- 3.5 K
- 3.6 G
- 3.7 B
- 3.8 D
- 3.9 J
- 3.10 A

(10 × 1) [10]

QUESTION 4

- 4.1 Check valve
- 4.2 Clearance
- 4.3 Rotates
- 4.4 Leakage
- 4.5 Expands

(5 × 1) [5]

TOTAL SECTION A: 30

SECTION B**QUESTION 5**

- 5.1 5.1.1 • Reduces the possibility of carbon being trap between the valve seat and face
 • Valve tends to dish slightly when hot and forms a tight seal
 • Provides proper face to seat contact
 • Equalises the running temperature between face and seat (4)
- 5.1.2 • Keeps the valve seat and stem from carbon build-up
 • Maintains even valve temperature
 • Extends the life of the valve face and seat
 • Reduces the tendency of the valve to burn (4)
- 5.2 • Valve will not close properly
 • Loss of pressure in the cylinder
 • Valves will burn away as a result of high temperature
 • Engine will overheat
 • High fuel consumption
 • Low thermal efficiency (Any 4 × 1) (4)
- 5.3 • Noisy engine
 • Excessive wear
 • Inadequate valve opening
 • Valve timing will be affected (Any 3 × 1) (3)
- [15]**

QUESTION 6

- 6.1 • Allows for the maximum delivery of fuel for cold start
 • Controls the engine maximum speed to prevent engine over revving
 • Allows engine to idle smoothly
 • Controls the delivery of fuel according to engine load and speed (4)
- 6.2 • Reduces driver fatigue
 • Uses a torque convertor to reduce tyre wear
 • Provides great reduction of wheel spin under bad conditions
 • Supplies the exact amount of torque required by the road wheels
 • Prevents the engine from over revving (5)
- 6.3 • Delivery pressure
 • Transfer pressure
 • Metering pressure
 • Injection pressure
 • Unloading pressure (5)

- 6.4
- Valve response is quicker
 - Higher engine speeds are possible
 - A hemispherical I- head can be used for a higher compression ratio
 - Injector can be fit in the middle of the combustion chamber
 - A high volumetric efficiency is obtained because four valves per cylinder can be used
- (5)
- 6.5
- Reduces driver fatigue
 - Reduces the number of steering wheel turns
 - Lessens the kick-back at the steering wheel
 - Provide safety during sudden swerving
 - Allows for heavy loads on steered wheels
 - Impose safety by resisting any sudden swerving
- (6)
- [25]**
- TOTAL SECTION A: 40**

QUESTION 7

- 7.1
- 7.1.1 Move pinion gear towards the centre of crown wheel
- 7.1.2 Move pinion gear away from the centre of crown wheel
- 7.1.3 Move crown wheel away from the pinion gear
- 7.1.4 Move crown wheel towards the pinion gear
- (3 × 4) (12)
- 7.2.1 **Advantages**
- Can be made slightly shorter
 - Better cooling can be provided for exhaust valves
 - Provides good volumetric efficiency
- 7.2.2 **Disadvantages**
- Tappet covers develop oil leaks
 - Extra provision required for valve mechanism lubrication
 - Injector can only be fitted on the side of the combustion chamber
- (3 × 2) (6)
- 7.3
- 7.3.1 18,17 CR
- 7.3.2 7,99 CR
- 7.3.3 61,81%
- 7.3.4 65,30%
- 7.3.5 5,99 CR
- 7.3.6 71,24%
- (6 × 1) (6)

$$7.4 \quad V_s = V_c(CR-1)$$

$$V_s = 32,50(15,55-1)$$

$$V_s = 472,875 \text{ cm}^3 \checkmark$$

$$V_c = \left[\frac{472,875}{15,55-1} \right] = 32,50 \text{ cm}^3 \checkmark$$

$$\begin{aligned} \text{New } h &= \left[\frac{32,50 \times 4}{\pi(7,555)^2} \right] \\ &= 0,725 \text{ cm} - 0,055 = 0,67 \text{ cm} \checkmark \end{aligned}$$

$$c = \left[\frac{\pi(7,555)^2}{4} \right] \times 0,67 \checkmark$$

$$= 30,035 \text{ cm}^3 \checkmark$$

$$\text{New CR} = \frac{472,875 + 30,035}{30,035}$$

$$= 16,74:1 \checkmark$$

(6)
[30]

TOTAL SECTION C: 30
GRAND TOTAL: 100