



higher education
& training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MOTOR TRADE THEORY N3

29 November 2023

This marking guideline consists of 6 pages.

QUESTION 1

- 1.1
- $$Cr = \frac{Vs + Vc}{Vc}$$
- $$CrVc - Vc = Vs$$
- $$Vs = Vc (Cr - 1)✓$$
- $$= 230 (17 - 1)✓$$
- $$= 3680 \text{ cm}^3✓$$
- $$V = \frac{\pi D^2}{4} \times Ls$$
- $$\frac{4 \times Vs}{\pi} = D^2✓✓$$
- $$= 68,451 \text{ cm}✓ \quad (6)$$
- 1.2.
- Engine misfire
 - Rough idling
 - Puffing noise in inlet/exhaust manifold
 - Smoking engine
 - Compression or power loss
- (Any 3 × 1) (3)
- 1.3
- Skim cylinder head
 - Skim engine block
 - Fit high compression pistons
 - Fit turbocharger/supercharger
- (Any 3 × 1) (3)
- 1.4
- Increased power
 - Increased acceleration
 - Overheating
 - Increased fuel consumption
 - Increased wear on parts
- (Any 3 × 1) (3)
- 1.5
- Roots Superchargers
 - Twin-Screw Superchargers
 - Centrifugal Supercharger
- (3)
- 1.6 Belt driven off crankshaft (1)
- 1.7 From the engine oil (1)
- [20]**

QUESTION 2

- 2.1 2.1.1 False
 2.1.2 True
 2.1.3 False
 2.1.4 True
 2.1.5 False
 2.1.6 True
 2.1.7 False

(7 × 1) (7)

- 2.2 A – Rocker Arm
 B – Cam Shaft
 C – Valve Spring Retainer
 D – Valve Spring
 E – Valve Guide
 F – Valve Stem
 G – Valve Seat Insert

(7)

- 2.3 Cross flow head refers to a cylinder head where the inlet and exhaust manifolds are mounted on opposite sides.

(2)

- 2.4 • Better fuel efficiency
 • Improved volumetric efficiency
 • More engine power

(Any 2 × 1) (2)

- 2.5 • Single-point injection
 • Multi-point injection

(2)

[20]**QUESTION 3**

- 3.1 Fuel is drawn from the fuel tank by a fuel pump.✓ Electronic fuel injection (EFI) system uses engine sensors,✓ a computer and solenoid-operated fuel injector to meter✓ and inject right amount of fuel into the cylinders.✓ An electronic control unit receives information in the form of electric signals from the sensors.✓ These sensors are mounted at different parts of the engine.✓ On the basis of requirements of the engine, the electronic fuel injection system injects right amount of fuel into the engine.✓✓

(8)

- 3.2 • Engine fails to start
 • Loss of engine power

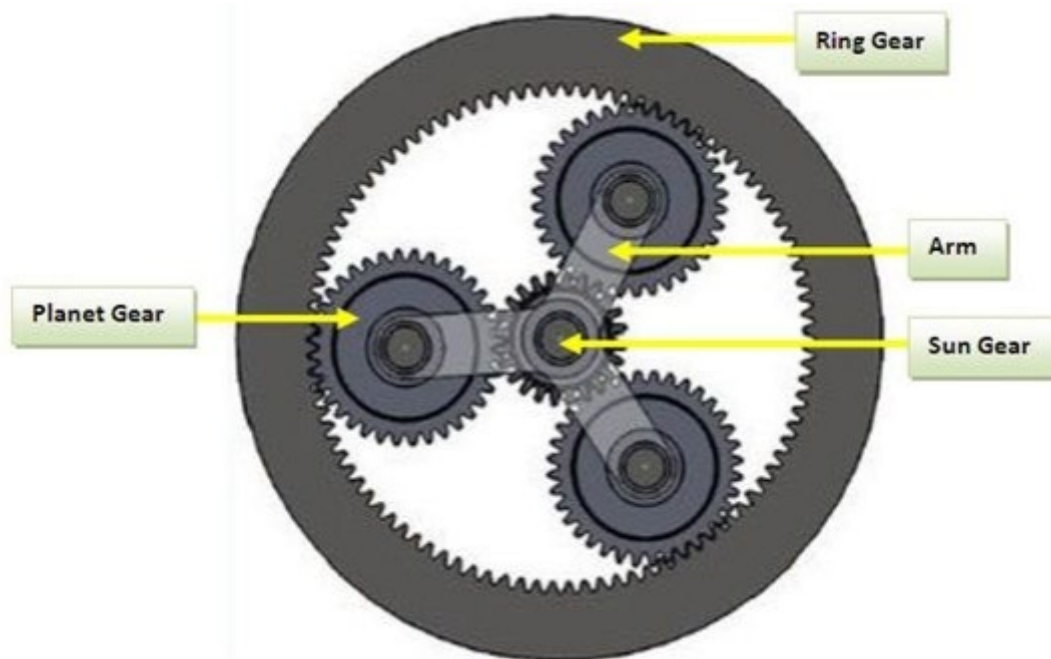
(2)

- 3.3 The coils rest on top of the spark plugs.✓ In addition, there are no spark plug wires in the system, and it is electronic.✓ In this system, the spark plug is fired from the coil and the timing of the spark plug is controlled by an ignition control unit (ICU)✓ and engine control unit (ECU), making the system more efficient and reliable.✓ Distributorless ignition systems normally consist of one coil per cylinder or one coil for each pair of cylinders.✓ By using multiple ignition coils, each spark plug in these cylinders will ignite at the same time. These types of systems are also known as direct ignition systems (DIS).✓ (6)
- 3.4 A – Pump
B – Stator
C – Input shaft
D – Turbine (4)

[20]**QUESTION 4**

- 4.1 4.1.1 It delivers transmission fluid from the transmission pan to the valve body.
- 4.1.2 This component directs all the pressure from the oil pump to all of the gearbox components to get the desired operation.
- 4.1.3 Giving the gearbox the desired output ratio
- 4.1.4 Brake bands serve one purpose, which is to temporarily hold planetary gears.
- 4.1.5 The system works by locking two of the three gear sets at a time. Since each gear set is a different size, this gives you a multitude of gear ratios.
- (5 × 1) (5)

4.2



(5)

4.3

Advantages:

- The high driving comfort
- The low-wear technology
- High torque when starting up

(Any 2 × 1)

Disadvantages:

- Usually heavier and larger
- More expensive

(2 × 2)

(4)

4.4

- The pump
- Belt
- Hoses, for leaks, damage or signs of wear or deterioration
- Power steering fluid condition

(4)

4.5

- Once a year
- At every service
- According to manufacturer's specifications

(Any ONE)

(1)

4.6

A computer system inside a vehicle that tracks and regulates a car's performance. This on-board computer system collects information from the network of sensors inside the vehicle, which the system can then use to regulate car systems or alert the user to problems.

(1)
[20]

QUESTION 5

- 5.1 A – Engine
 B – Front axle differential
 C – Gearbox/Transmission
 D – Front axle shaft
 E – Propeller shaft
 F – All-wheel drive clutch assembly
 G – Rear axle differential
 H – Rear axle shaft (8)
- 5.2 All-wheel drive system (1)
- 5.3 • Increases a car's power and speed by using engine power more efficiently
 • Allowing for a smoother and more enjoyable drive
 • Prevents slippage and spinouts
 • A safer and smoother ride (4)
- 5.4. • Plug the scanner into the port under the steering column✓✓
 • Turn the key to the 'on' position✓
 • Press the 'read' button on the scanner✓
 • Press the 'erase/clear' button on your scanner✓
 • Then turn off the key✓ (6)
- 5.5 Below 3 000 r/min (1)
- [20]**

TOTAL: 100