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.

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QUESTION 1

1.1 $Cr = \frac{Vs + Vc}{Vc}$

CrVc – Vc =Vs

Vs = Vc (Cr − 1)✓

= 230 (17 − 1)✓

= 3680 cm^3✓

$V = \frac{\pi D^2}{4} X\ Ls$

$\frac{4\ X\ Vs}{\pi} = D^2$✓✓

= 68,451 cm✓ (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)

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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.

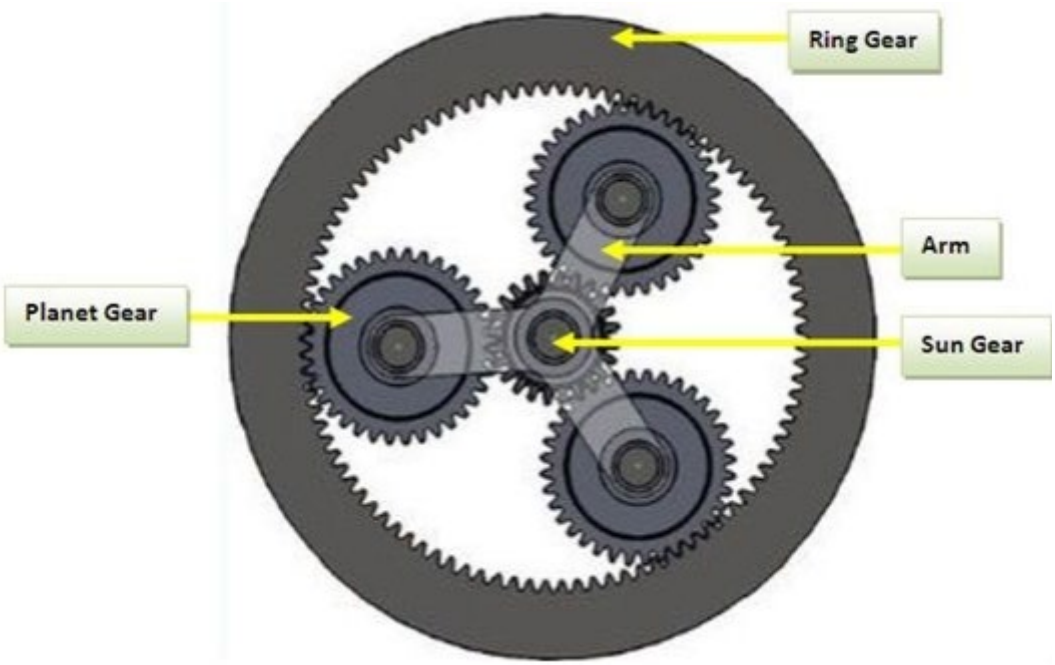
4.1.3 Giving the gearbox the desired output ratio

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

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