higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

AUTOMOTIVE REPAIR AND MAINTENANCE
NQF LEVEL 4

28 November 2023

This marking guideline consists of 5 pages.

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QUESTION 1

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

(10 × 1) **[10]**

QUESTION 2

2.1 True
2.2 False
2.3 True
2.4 True
2.5 True

(5 × 1) **[5]**

QUESTION 3

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

(10 × 1) **[10]**

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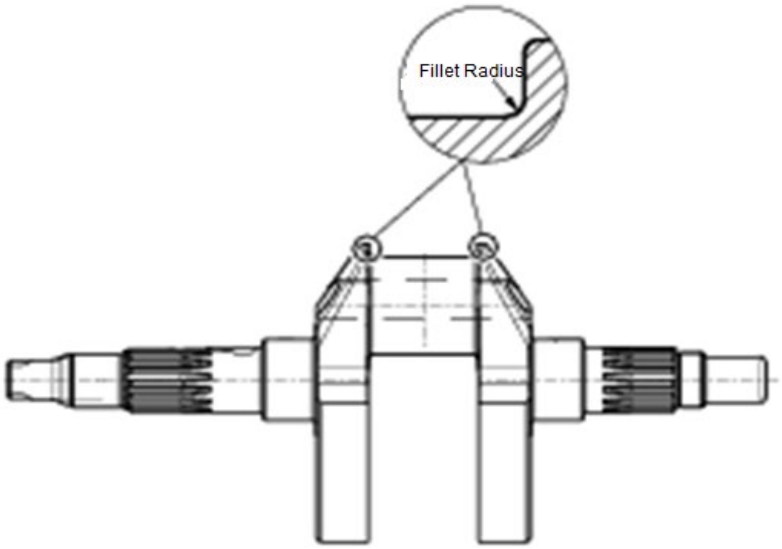
QUESTION 4

4.1
- The safety of the technicians, only certified specialists should be used.
- The necessary protection of the technicians should be in place, such as the wearing of PPEs.
- The position of the battery in the vehicle is important in case of accidents.
- Exposure to acids for occupants during a collision should be prevented.
- Exposure to high voltage in case of collisions should be prevented.
- The proper discarding of old batteries and prevention of pollution to protect the environment.

(Any relevant 4 × 1) (4)

4.2



(4)

4.3 SI: In an SI engine an air/fuel mixture is compressed✓ at a rate that by the end of the compression stroke the temperature of the mixture has risen to a critical point✓ where the introduction of a spark sets the highly combustible mixture alight.✓
CI: In a CI engine clean air is compressed✓ to the point where the heat of the air will ignite the fuel✓ when it is injected in an atomised form into the combustion chamber.✓ (6)

4.4 $V = \frac{\pi}{4} \times d^2 \times h$✓

$V = \frac{\pi}{4} \times 6{,}5^2 \times 7{,}4$✓

$V = 245{,}554$ ✓cm^3✓ (4)

4.5
1. Brake band
2. Clutches
3. Speed governor
4. Throttle valve
5. Manual valve
6. Primary oil pressure regulator
7. Secondary oil pressure regulator
8. Pressure relief valve (8)

4.6 The cold temperature range is between 18 and 65^0.
The hot temperature range is between 88 and 190^0. (2)
[28]

QUESTION 5

5.1
1. Pinion/pinion gear
2. Crown wheel
3. Crown wheel shaft
4. Gear shift collar
5. Low speed gear set
6. Differential carrier
7. Cross pin
8. Sun gears and side shafts (Any 5 in correct sequence) (5)

5.2
- CO is the abbreviation for carbon monoxide. ✓
- Carbon monoxide is a toxic by-product of partially burned fuel. ✓ (2)

5.3
- Park the vehicle in a safe area where the engine can stay running.
- Collect the appropriate tools and equipment including the CO meter.
- Start the engine and warm it up to working temperature.
- Connect CO meter power supply and gas pipe to exhaust.
- Switch on and calibrate the meter.
- Rev the engine for two minutes and then let it idle.
- Read the meter and adjust the CO reading to manufacturer's specifications.
- Restore the work area and vehicle. (Any relevant 8 × 1) (8)

5.4 The rotary pump is mounted on the engine and is typically driven by a gear from the timing arrangement. As the rotor turns, one of the inlet ports in the rotor opens to the metering port in the head.✓ Fuel at metering pressure enters the rotor and separates the plungers.✓ As the rotor continues to turn, the inlet port closes off again and shortly afterwards the distributor port aligns with one of the fuel outlets.✓ Both rollers then contact opposing cam lobes✓ and the plungers are forced towards each other.✓ This is the injection stroke, and the fuel trapped between the plungers is forced back through the rotor and out to the injector.✓ Fuel displacement ceases when the plungers reach the limit of inward travel imparted by the cam lobes.✓ Shortly afterwards the distributor port closes,✓ sealing off the fuel pipe to the injector.✓ As the rotation of the rotor continues, the cycle repeats itself for each cylinder.✓

(Any relevant 10 × 1) (10)
[25]

QUESTION 6

6.1
- Electronic leak detector✓: the tester detects the gas with a sensor and will produce a sound or light if detected. ✓
- Internal charge detection: ✓ a colouring agent is injected and will show as a bright orange-red spot at the leaking point. ✓
- Torch detection✓: detect with an open flame, leaking gas will change the colour of the flame torch. ✓
- Bubble detection: ✓apply a solution to the suspected area and run the system, any leak will cause bubbles or foam at the point. ✓ (4 × 2) (8)

6.2
- The wheel sensors
- The ATS (Automatic Traction Control valve)
- The ECU (Electronic Control Unit) (3)

6.3
- Mechanical brake assist
- Electronic brake assist (2)

6.4 The airbag is vehicle and manufacturer specific according to international standards.✓ The airbag must match the system of the particular make and model of the car.✓ (Any relevant × 2) (2)

6.5
- Printed circuit boards
- Various electronic components
- Various coloured wires
- Solder
- Soldering iron
- Solder sucker
- 12V Battery
- Electronic measuring tools/devices/instruments (7)

[22]

TOTAL: 100

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