



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MOTOR ELECTRICAL THEORY N1

31 JULY 2018

This marking guideline consists of 5 pages.

QUESTION 1

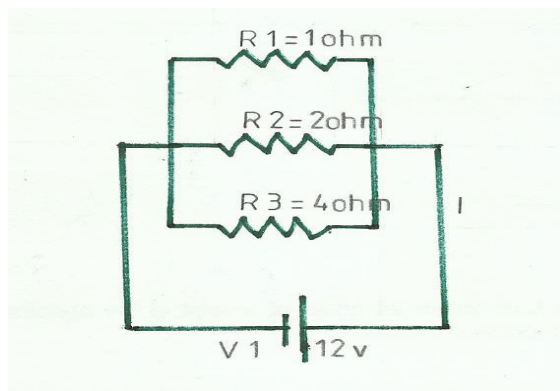
1.1	1.1.1	B
	1.1.2	C
	1.1.3	D
	1.1.4	C
	1.1.5	A
	1.1.6	D
	1.1.7	A
	1.1.8	B
	1.1.9	A
	1.1.10	C

(10 × 1) (10)

- 1.2 The electric pump consists of electromagnet✓ and a set of points✓ to turn the magnet on and off. The points are directly✓ connected to the armature which is linked to the pump✓ diaphragm.
- When the pump runs dry the diaphragm lifts the✓ armature which closes✓ the points. Current✓ now energises the coil and the electromagnet pulls✓ in the armature and the diaphragm. At the same time the points are✓ opened and the coil de-energised✓ until the pump runs dry again.

(10)
[20]**QUESTION 2**

2.1 2.1.1



✓✓✓

(3)

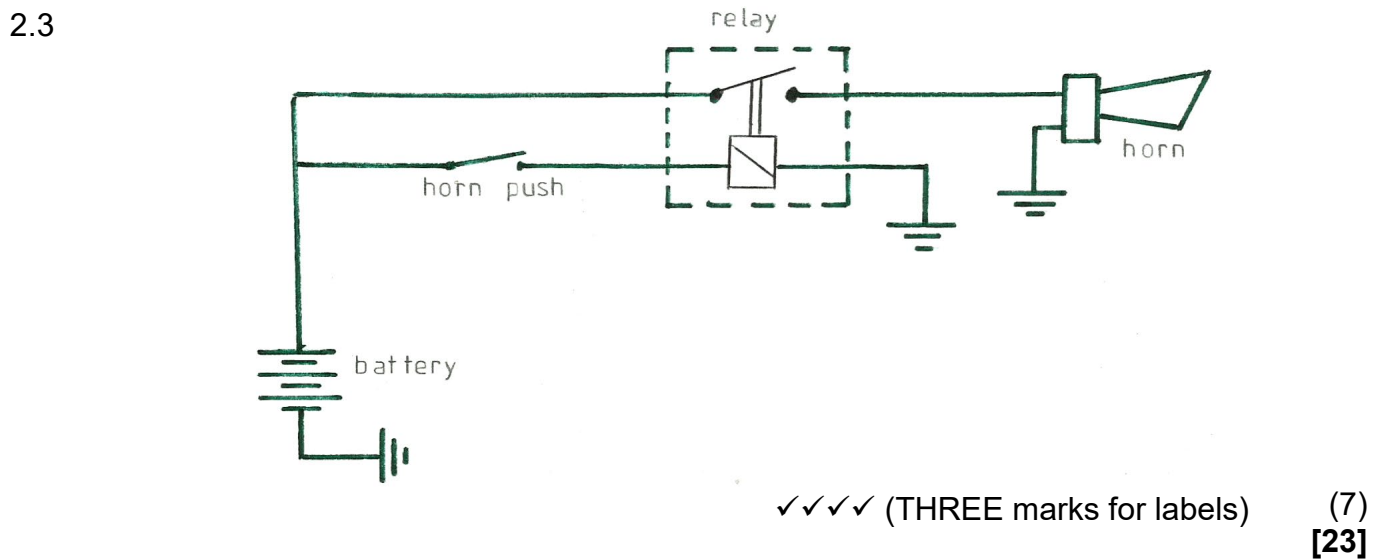
$$\begin{aligned}
 2.1.2 \quad \frac{1}{R_t} &= \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \\
 &= \frac{1}{1} + \frac{1}{2} + \frac{1}{4} \checkmark \\
 &= \frac{4+2+1}{4} \\
 &= \frac{7}{4} \\
 R_t &= \frac{4}{7} \checkmark \\
 &= \underline{0,571 \Omega} \checkmark
 \end{aligned}$$

(3)

$$\begin{aligned}
 2.1.3 \quad I &= \frac{V}{R} \\
 &= \frac{12}{0,571} \checkmark \\
 &= \underline{21,016 \text{ A}} \checkmark \quad (2)
 \end{aligned}$$

$$\begin{aligned}
 2.1.4 \quad I &= \frac{V}{R} \\
 &= \frac{12}{4} \checkmark \\
 &= \underline{21,016 \text{ A}} \checkmark \quad (2)
 \end{aligned}$$

2.2 The moving coil petrol gauge consists of a u-shaped permanent magnet. The pole pieces are circular shaped to accommodate a fixed cylinder. A coil wound on an aluminium drum is placed in the fixed cylinder and allowed to pivot on its axis. The gauge pointer is fixed to this drum. When current from the tank float flows through the coil, the magnetic fields are distorted causing the drum to rotate. The pointer that moves with the drum then indicates the fuel level. (6)



QUESTION 3

	HOT PLUG	COLD PLUG	
3.1	<ul style="list-style-type: none"> • Transfer heat slower✓ • Allow for higher combustion chamber temperature✓ • More suited for slower speeds✓ 	<ul style="list-style-type: none"> • Transfer heat quicker✓ • Allow lower combustion chamber temperatures✓ • More suited for higher speeds✓ 	(6)

- 3.2
- A battery
 - B ignition switch
 - C ballast resistor
 - D ignition coil
 - E distributor
 - F high tension leads/plug cables
 - G spark plug
- (7)



3.4 reverse bias✓ (1)

- 3.5
- amplifier✓
 - switch✓
- (2)
[19]

QUESTION 4

- 4.1 Sulphation is the formation of lead sulphate✓ on the positive and negative plates of the battery. The formation of lead sulphate occurs as a result✓ of the charging and discharging of the battery. Lead sulphate is a hard substance that does not conduct electricity.✓ It increases the internal resistance✓ of the battery and if excessive, lowers✓ the capacity of the battery. The battery eventually fails. (5 × 1) (5)
- 4.2 60% water and 30% acid (1)
- 4.3 Alkaline batteries have a higher energy capacity (1)
- 4.4
- Ensure that the information regarding recoding and initialising of such systems is available.
 - Ensure that the disconnecting and connecting procedures are followed according to manufacturer's specifications. (2)

- 4.5 6 mm above the plates (1)
- 4.6 The lead-acid cell consists of alternately arranged positive✓ and negative plates. The positive and negative plates are connected✓ in groups by straps. A porous insulating✓ material separates the plates from each other. The plates are made from lead✓ antimony and are in the form of a grid. The grid is then filled with a paste of lead oxide✓ for the positive plates and sponge lead✓ for the negative plates. (6)
- 4.7
- Ensure that the terminals are connected in the correct polarity.
 - Keep the battery clean.
 - Clamp the battery down securely, not too tight.
 - Ensure that the terminals are properly tightened.
 - Periodically apply anti-corrosion agent to the terminals.
 - Periodically top up the electrolyte level with distilled water. (Any 4 × 1) (4)
- [20]**

QUESTION 5

- 5.1
- incandescent bulbs
 - halogen bulbs
 - Xenon bulbs
 - LED lights (4 × 1) (4)
- 5.2
- iodine
 - bromide (2)
- 5.3 This feature adjusts the headlights in the horizontal✓ plane according to steering✓ angle. The angle of adjustment, which can be as much as✓ 15° is controlled by the ECU which reads✓ the angle of the steering. When turning left, the headlights✓ will angle to the left, increasing visibility to the left. This is a safety✓ feature especially on winding roads where visibility can be increased up to 50%.✓ (6)
- 5.4
- 1 turn signal
 - 2 alternator warning light
 - 3 engine control malfunction
 - 4 oil pressure warning light
 - 5 high beam
 - 6 engine temperature warning light (6 × 1) (6)
- [18]**

TOTAL: 100