



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MOTOR ELECTRICAL THEORY N1

13 April 2021

This marking guideline consists of 6 pages.

MARKING GUIDELINE

-2-

MOTOR ELECTRICAL THEORY N1

QUESTION 1

1.1	1.1.1	B	(10 × 1)	(10)
	1.1.2	B		
	1.1.3	B		
	1.1.4	D		
	1.1.5	B		
	1.1.6	C		
	1.1.7	C		
	1.1.8	D		
	1.1.9	D		
	1.1.10	B		
1.2	1.2.1	True	(10 × 1)	(10)
	1.2.2	True		
	1.2.3	True		
	1.2.4	True		
	1.2.5	False		
	1.2.6	True		
	1.2.7	False		
	1.2.8	False		
	1.2.9	True		
	1.2.10	False		

QUESTION 2

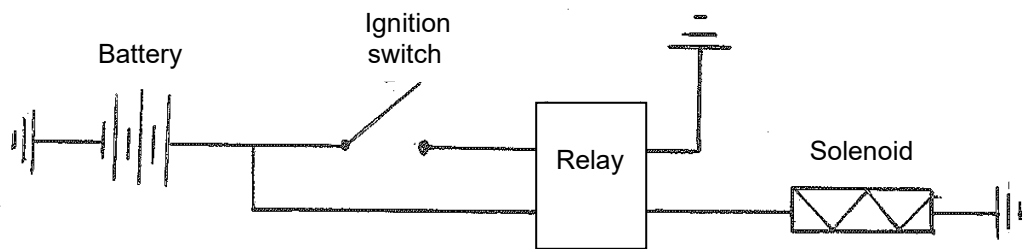
2.1	<p>The diagram shows a circuit with a 12 V DC source on the left. A 0,5 Ω resistor is connected in series with the source. The circuit then splits into four parallel branches, each containing a resistor. The resistors are labeled with their values: 5 Ω, 4 Ω, 2 Ω, and an unlabeled resistor.</p>	(3)
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QUESTION 3

- 3.1
- When two coils are placed close to each other,
 - the magnetic field created by the current flowing in the first coil,
 - induces a current in the second coil. (3)
- 3.2
- A cold spark plug has a shorter centre electrode.
 - A hot spark plug has a longer centre electrode. (2)
- 3.3
- When the ignition is turned on
 - and the points are closed, current flows through the primary windings of the coil.
 - A magnetic field is set up inside the coil by the primary windings.
 - As the points open, current stops flowing and the magnetic field collapses.
 - The collapsing magnetic lines cut through the secondary coil.
 - An instantaneous high-voltage current is induced in the secondary coil and is transferred via the rotor and HT leads to the spark plug. (6)
- 3.4
- Battery
 - Ignition switch
 - Ballast resistor
 - Primary coil windings
 - Points
 - Condenser/capacitor
 - Distributor
 - Low-voltage wiring (Any 6 × 1) (6)
- [17]**

QUESTION 4

- 4.1
- A relay is used to remotely switch on
 - a high-current circuit
 - by using a low current closer to the current source and consumer. (3)
- 4.2 4.2.1

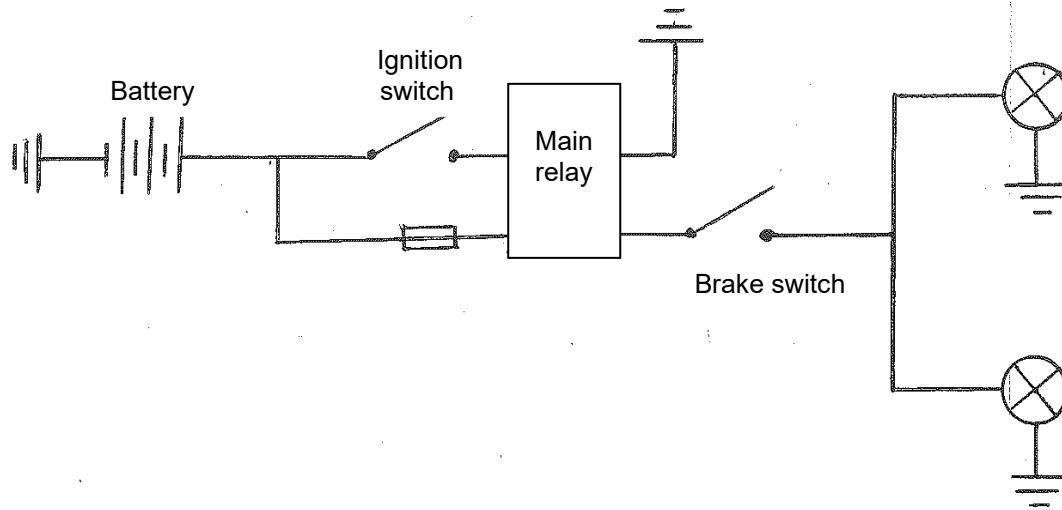


(6)

- 4.2.2
- Over time the wiring connections and switch gear develop a high resistance.
 - The current therefore is reduced, and not enough to activate the starter solenoid.
 - By installing the relay, direct battery voltage with a higher current capacity is used to energise the solenoid.
- (3)

4.3 It protects the circuit against an overload. (1)

4.4

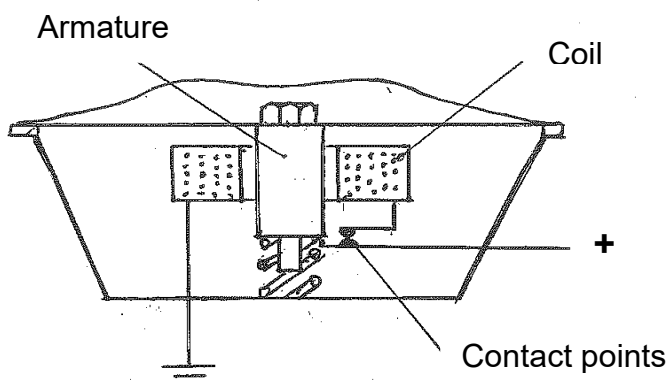


(6)

4.5 The globe is fused. (1)
[20]

QUESTION 5

5.1



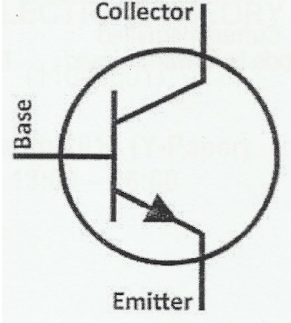
(5)

- 5.2
- When the hooter button is pressed, current will flow over the closed hooter contact points
 - and through the hooter coil.
 - The magnetic field created pulls in the armature.
 - Because the points are connected to the armature, the points are opened at the end of the armature travel.
 - The current stops flowing and the magnetic field collapses
 - allowing the armature to return to its resting position, closing the points.
 - The cycle repeats.
- (7)

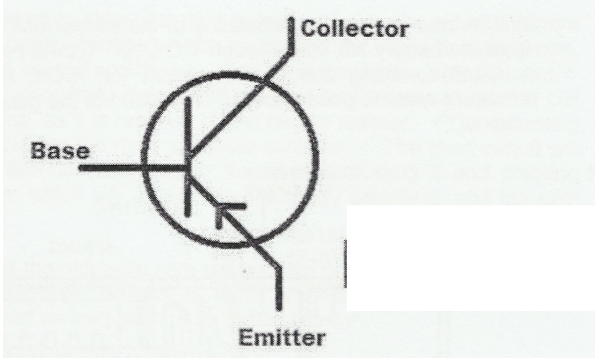
- 5.3
- 5.3.1 Engine management fault
 - 5.3.2 Low oil pressure
 - 5.3.3 Engine overheating
 - 5.3.4 Brake system faulty
 - 5.3.5 Alternator faulty
- (5 × 1) (5)
[17]

QUESTION 6

6.1



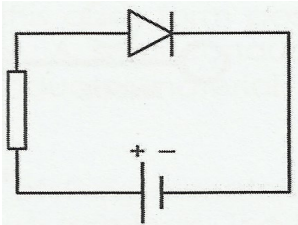
NPN transistor



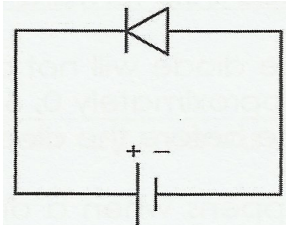
PNP transistor

(2 × 3) (6)

6.2



Forward bias



Reverse bias

(2 × 2) (4)
[10]

TOTAL: 100