higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MOTOR ELECTRICAL THEORY N1

5 April 2018

This marking guideline consists of 7 pages.

QUESTION 1

1.1
1.1.1 False
1.1.2 True
1.1.3 True
1.1.4 True
1.1.5 True
1.1.6 False
1.1.7 True
1.1.8 False
1.1.9 False
1.1.10 False

(10 × 1) (10)

1.2
1.2.1 Headlamps
1.2.2 Voltage
1.2.3 windshield wiper
1.2.4 double filament
1.2.5 electromagnet

(5 × 1) (5)
[15]

QUESTION 2

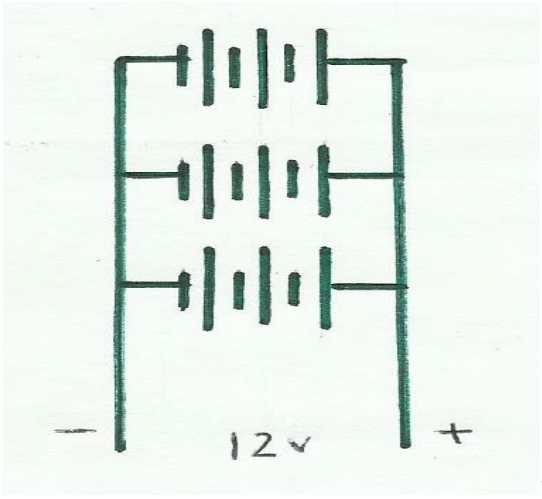
2.1
- No✓
- In a series circuit, a break anywhere✓ in the circuit disrupts current flow through the entire✓ circuit. The remaining bulb therefore also does not light up. (3)

2.2
P = VI
= 12 x 8✓✓
= 96 W ✓ (3)

2.3
- Plastic
- Rubber
- Porcelain
- Bakelite
- Glass

(Any 3 × 1) (3)

2.4 2.4.1



✓✓✓ (3)

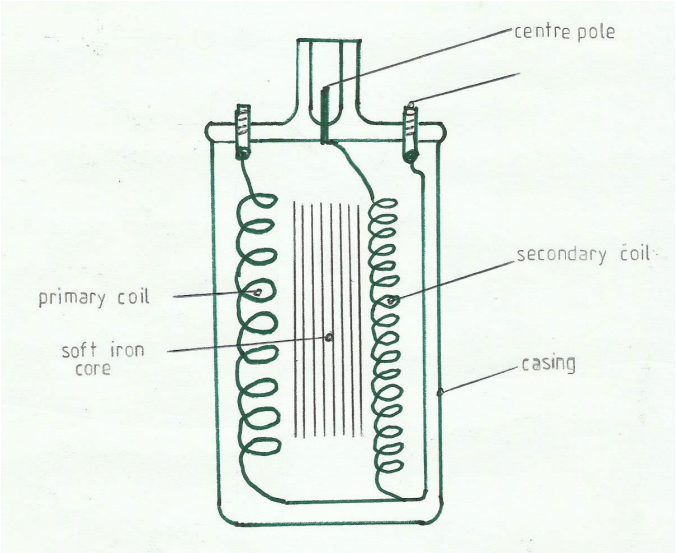
2.4.2 $V_T = V_1 + V_2 + V_3 = 12v$✓ (1)

2.5
- Length
- Temperature
- Cross-sectional area (3)

[16]

QUESTION 3

3.1

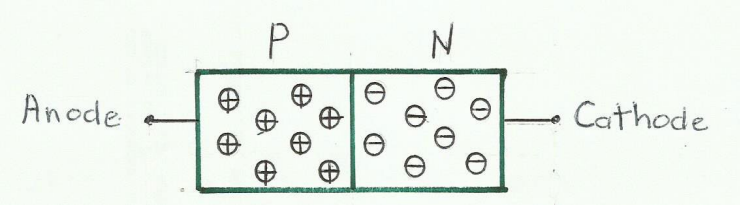


✓✓✓✓✓(Three marks for labels) (8)

3.2 Transistor (1)

3.3 Function: To advance ignition timing according to the engine load.✓
Operation: The vacuum advance unit is mounted✓ on the distributor and is connected with a lever to the base plate.✓
At idle, the vacuum above the butterfly valve is too✓ weak and the unit is inactive.
As the butterfly valve opens, the vacuum is increased✓ and starts to act on the diaphragm, pulling it in. The base plate which is connected to the diaphragm is also rotated✓against shaft rotation.
The points are allowed to open✓earlier, thereby advancing the timing. (7)

3.4

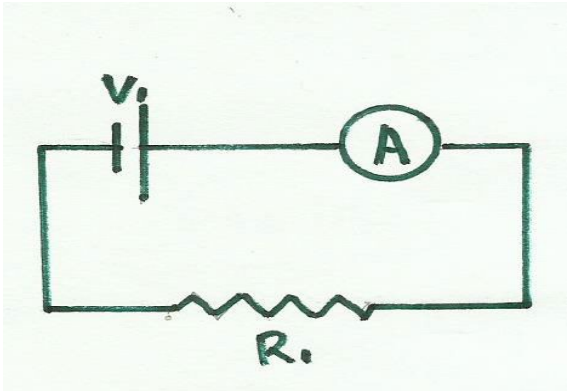


✓✓✓ (One mark for labels) (3)
[19]

QUESTION 4

4.1
- EMF is battery voltage when in open circuit.
- Voltage is battery voltage when in closed circuit. (2)

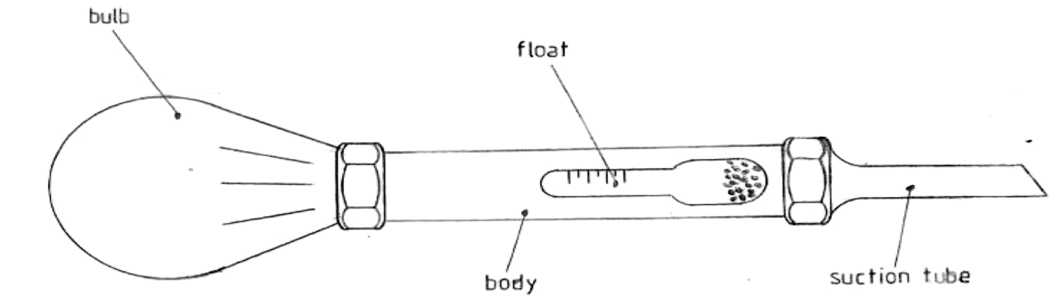
4.2



✓✓✓ (3)

4.3 In the conventional battery, the plate grid material is lead✓ antimony, while in the low-maintenance battery it is lead✓calcium. (2)

4.4



(Three marks for labels) ✓✓✓✓✓ (6)

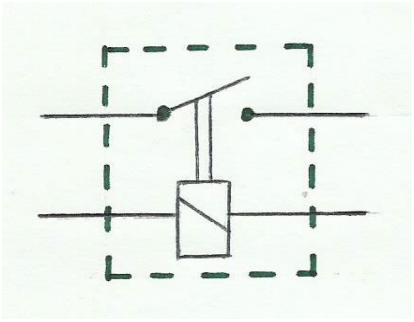
4.5
- Hydrometer test
- Load test/High discharge test (2)

[15]

QUESTION 5

5.1 Construction: The xenon bulb consists of two electrodes✓ ending in a chamber filled with a xenon gas✓ mixture. The electrodes are connected to a ballast✓ that provides the high voltage required to vaporise the gas.
Operation: When the lights are turned on, the ballast generates a high voltage of 10 to✓ 20 kV. This high voltage ionises✓ the xenon gas mixture to conduct electricity.
The heat generated in the process✓ vaporises the gas to radiate✓ a high-intensity light. (8)

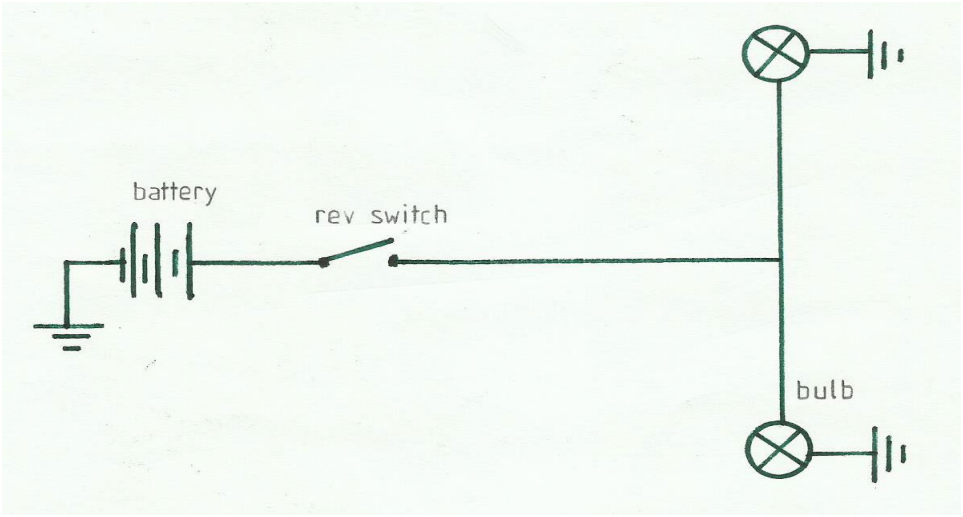
5.2



(4)

5.3 The relay reduces✓ the current load on the light switch. It utilises a low current✓ to turn on a higher current. By placing the relay closer to the battery and headlights, the high current circuit is✓ shorter, reducing the resistance and increasing the effectiveness✓of the lights. (4)

5.4



✓✓✓ (Two marks for labels) (5)
[21]

QUESTION 6

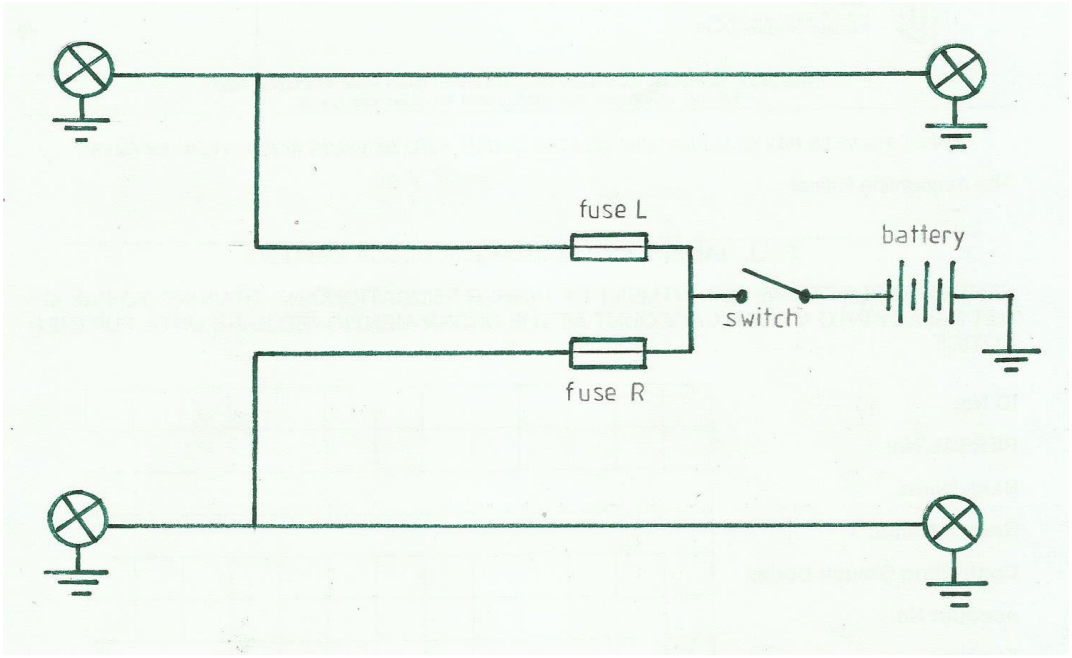
6.1 Current overload due to short-circuiting (1)

6.2 Wiring diagram (1)

6.3 When current is passed✓ through a conductor, a magnetic field✓ is set up around the conductor. (2)

6.4
- Test for short-circuits
- by measuring the end-to-end resistance of the coil.
- Inspect the coil for physical damage.
- Inspect the coil for overheating. (4)

6.5



✓✓✓ (Three marks for labels) (6)
[14]

TOTAL: 100