higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

ELECTRICAL TRADE THEORY N1

4 APRIL 2017

This marking guideline consists of 5 pages.

QUESTION 1

1.1 True
1.2 True
1.3 True
1.4 True
1.5 False
1.6 True
1.7 True
1.8 True
1.9 False
1.10 True
1.11 True
1.12 False
1.13 False
1.14 True
1.15 False
1.16 False
1.17 True
1.18 True
1.19 False
1.20 True

(20 × 1) **[20]**

QUESTION 2

2.1

CLASS	MATERIAL	FIRE EXTINGUISHER
A	Wood, paper, coal tobacco, glass and other organic materials	Water; basically tap water
B	Flammable liquids and gases, for example alcohol, benzene, oil, paraffin and petrol	Foam
C	Fire occurring in the presence of live electrical installations	Dry powder
D	Fire involving metals	Special powder for metallic fires

(4 × 2) (8)

2.2
- The ladder must be checked for safety before being used.
- The rings must be in good condition.
- Wooden ladders must be checked for cracks.
- All reinforcing parts must be in place and properly fixed.
- In stepladders hinges and support straps must be checked.
- Ladders must be placed on a solid surface.
- Depending on the type of surface someone should hold the ladder at the bottom to prevent it from slipping.
- The ladder should be placed at a suitable angle.
- As a general rule the horizontal distance between the foot of the wall (or pole) to the bottom of the ladder should be about a third of the vertical height.
- The ladder should be 1 m above its support whenever possible.
- A safety belt must be used when working high up.
- A safety belt must be fitted firmly around one's waist.
- No people should stand underneath the ladder while someone is on it.

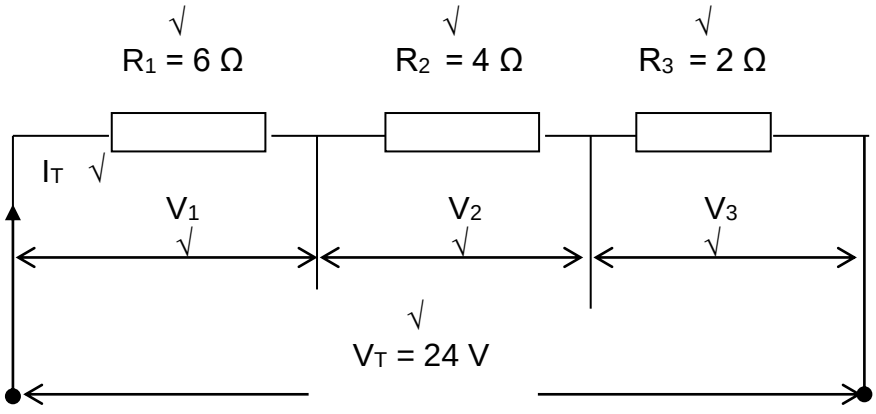
(Any 5 × 1) (5)
[13]

QUESTION 3

3.1 3.1.1 Heat generated in an electrical circuit is proportional to the square of the current, the resistance of the circuit and the time during which the current flows. (3)

3.1.2 $Q = I^2Rt$ where I is the current, R the resistance and t represents time. (3)

3.2



(2 marks only for unlabelled sketch) (5)

3.3 3.3.1 $R_T = R_1 + R_2 + R_3$
$= 6 + 4 + 2$
$= 12\ \Omega$ (2)

3.3.2 $I_T = V_T \div R_T$
$= 24 \div 12$
$= 2\ A$ (2)

3.3.3 $V_1 = I_T R_1$ $V_2 = I_T R_2$ $V_3 = I_T R_3$
$= 2 \times 6$ $= 2 \times 4$ $= 2 \times 2$
$= 12$ V $= 8$ V $= 4$ V (6)

3.3.4 $E = P \times t$
$= I^2_T R_T \times t$
$= 2^2 \times 12 \times 3 \times 60 \times 60$
$= 518\ 400$ J
$= 518{,}4$ kJ (4)
[25]

QUESTION 4

4.1

ADVANTAGES	DISADVANTAGES
• Fairly high efficiency • Rechargeable • Suitable for high-current drain • Constant voltage during discharge • Long lifespan with frequent maintenance (Any 3 × 1)	• Frequent maintenance required • Very heavy • Very large • Recharging is time-consuming (Any 2 × 1)

(3 + 2) (5)

4.2 4.2.1 $I_1 = (N_2 \div N_1) \times I_2$
$= (250 \div 1\ 000) \times 10$
$= 2{,}5$ A (2)

4.2.2 Turns ratio $= N_1 : N_2$
$= 1000 : 250$
$= 4 : 1$ (2)

4.2.3 $V_1 = (N_1 \div N_2) \times V_2$
$= (1\ 000 \div 250) \times 55$
$= 220$ V (2)

4.3 The relative density (or specific gravity) of an electrolyte is the ratio of the mass of a unit volume of the electrolyte to the mass of the same volume of water. (3)
[14]

QUESTION 5

5.1
- Fixed field system
- Controlling system
- Damping system
- Pointer (4)

5.2
- Direct connection
- Indirect connection (2)

5.3 An EMF is induced in an electric circuit wherever there is a change in the magnetic flux linking with the circuit. (4)
[10]

QUESTION 6

6.1 A semiconductor is a material with a resistivity between that of a good conductor and a good insulator dependent on prevailing physical conditions. (4)

6.2
- Each live conductor carries the same current value.
- The neutral conductor carries a small current.
- It is more economical. (3)

6.3 voltage (1)
[8]

QUESTION 7

7.1 A certificate of compliance must be obtained on:
- A new installation
- An extension to an existing installation (2)

7.2
- The megger
- At least 1 MΩ (2)

7.3 $C_T = C_1 + C_2 + C_3$
$= 6 + 8 + 12$
$= 26\ \mu F$ (2)

7.4 Yellow: 4
Violet: 7
Yellow: $\times 10^4$
Gold: ±5%
$\therefore R = 470\ k\Omega \pm 5\%$ (4)
[10]

TOTAL: 100