higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ELECTRICAL PRINCIPLES AND PRACTICE
NQF LEVEL 2

19 February 2025

This marking guideline consists of 5 pages.

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QUESTION 1

1.1 J
1.2 K
1.3 D
1.4 B
1.5 C
1.6 E
1.7 H
1.8 F
1.9 G
1.10 I

(10 × 1) **[10]**

QUESTION 2

2.1 2.1.1 B
2.1.2 D
2.1.3 C
2.1.4 B
2.1.5 D

(5 × 1) (5)

2.2 V=IR

$$R = \frac{V}{I} \checkmark = \frac{12}{2.2} \checkmark = 5.455\ \Omega \checkmark$$ (3)

2.3
- They are cheaper to manufacture than stranded conductors.
- They provide good mechanical strength. (2)

2.4 2.4.1 Contacts on terminals of printed circuit boards
2.4.2 Contacts
2.4.3 Heating elements
2.4.4 Filaments

(4 × 1) (4)

2.5 2.5.1 The longer the length of the conductor, the higher the resistance of the conductor
2.5.2 The thinner the cross-sectional area the lower the resistance. (2)
(2 × 1)

2.6 2.6.1 positive temperature coefficient (2)
negative temperature coefficient

2.6.2
- On a positive temperature coefficient when the temperature increases, the resistance also increases
- On negative temperature coefficient when the temperature increases, the resistance decreases (2)

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2.7 In a three-phase current system the current carried in the three conductors where the currents in each conductor lags by one third of a cycle✓ and in a single-phase current system the current is carried in one conductor.✓ (2)

2.8
- Natural magnets
- Artificial magnets
- Temporary magnets
- Permanent magnets

(Any 3 × 1) (3)

[25]

QUESTION 3

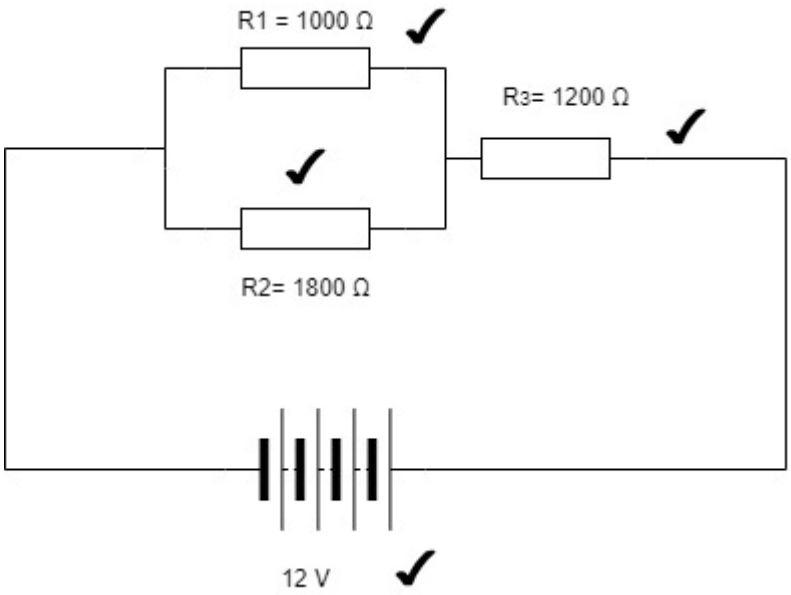
3.1 3.1.1 Short circuit
3.1.2 Closed circuit
3.1.3 Continuity

(3 × 1) (3)

3.2 3.2.1 The total EMF of the cells is equal to the EMF of each cell.
OR
1.5V (1)

3.2.2 The total internal resistance of the cell will be lower(decrease).
OR
$R_t = \frac{r}{n} = \frac{0.2}{3}$ = 0,066 Ω (1)

3.2 3.2.1



(4)

3.2.2 $R_P = \frac{R_1 \times R_2}{R_1 + R_2}$ (2)

$= \frac{1000 \times 1800}{1000 + 1800}$✓

$= 642{,}857\Omega$ ✓

OR

$\frac{1}{R_1} = \frac{1}{R_2} + \frac{1}{R_2}$

$= \frac{1}{1000} + \frac{1}{1\,800}$

$= 642{,}857\ \Omega$

3.3.2 $R_T = R_P + R_3$

$= 642.857 + 1200$✓

$= 1842.857\ \Omega$✓ (2)

3.4.1 $3 \times 2\,000\ W\ floodlight = 6\,000\ W$✓

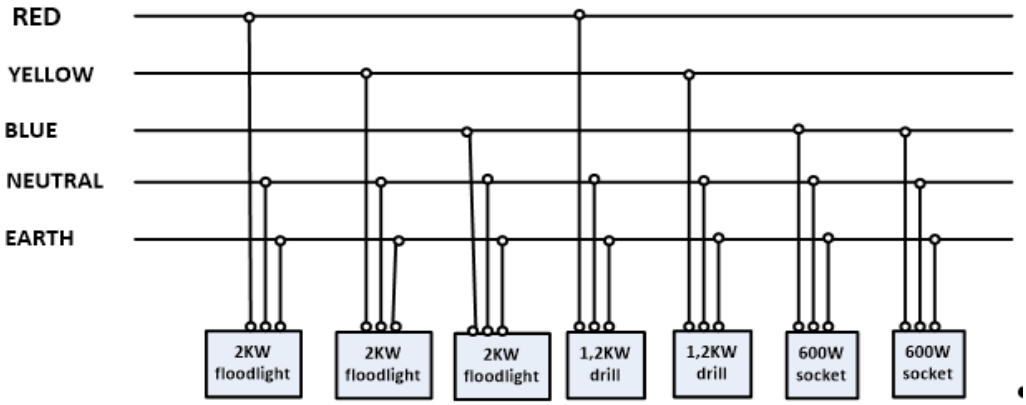
$2 \times 1\,200\ drilling\ machine = 2\,400\ W$✓

$2 \times 600W\ socket\ outlets = 1\,200\ W$✓

$Total\ Possible\ load\ per\ phase = \frac{9\,600W}{3}$✓

$= 3200\ W$✓ (5)

3.4.2



(1 mark for each correct connection of the load) (7)

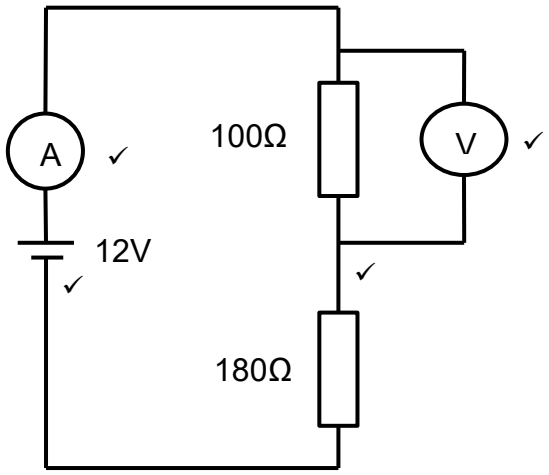
[25]

QUESTION 4

4.1
- Insulating live parts
- Using barriers or enclosures
- Placing the system out of reach (3)

4.2
- IT
- TN-C-S
- TN-S
- TT (Any 3 × 1) (3)

4.3



(4)

4.3.2 $I = \frac{v}{R} = \frac{12}{280}$✓ $= 0.043A$✓ (2)

4.3.3 $V = I.R = 0.043 \times 100$✓ $= 4{,}3V$✓ (2)

4.4 Megohmmeter or Megger tester✓ (1)

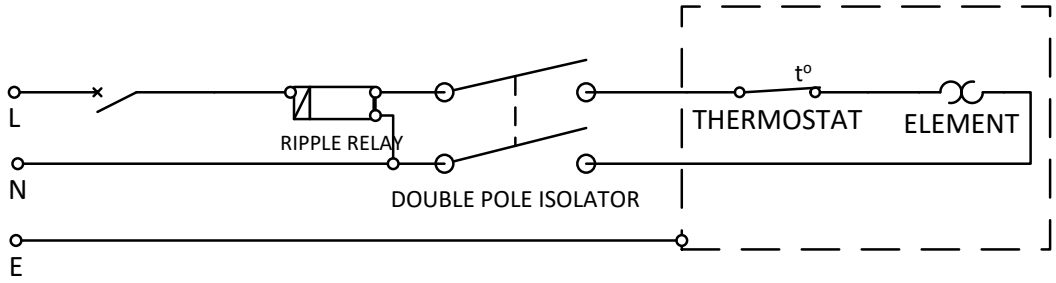
[15]

QUESTION 5

5.1
5.1.1 False
5.1.2 True
5.1.3 False
5.1.4 True
5.1.5 True (5 × 1) (5)

5.2
- Main Circuit breaker
- Circuit breaker
- Switch
- Isolator
- Lamp / Bulb
- Motor (Any 3 × 1) (3)

5.3



(1 mark L,N,E; 1 mark for each component) (7)
[15]

QUESTION 6

6.1
A Conductor
B Insulation
C Bedding
D Armouring
E Sheath (5)

6.2 A suspension-type insulator consists of several separate suspension units combined to form a flexible string.✓ The conductor is attached to the lower end. The number of insulator disc increases at higher voltages.✓ These insulators are also fitted with arcing horns.✓ An arc tends to transfer itself to these horns rather than jump across the insulator surfaces.✓ This reduces the possibility of damage to the insulator.✓ (5)
[10]

TOTAL: 100

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