higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

ELECTRICAL TRADE THEORY N1

22 August 2022

This marking guideline consists of 5 pages.

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QUESTION 1

1.1
- All labels should be clearly visible.
- All floors should be clean and tidy.
- Inflammable liquids and gases should be kept in stores built for the purpose.
- Stacking of stock should be proper and safe.
- Enough lighting should be available.
- Proper safety equipment should be at hand. (Any 3 × 1) (3)

1.2
- Isolate the supply to the circuit.
- Lock the switch.
- Always place a notice at the switch.
- Test the conductors before touching them to ensure they are OFF.
- Earth all conductors supplying that circuit.
- Disconnect all the supply conductors.
- Remove the faulty motor or electrical appliance. (Any 3 × 1) (3)

1.3
- Machines guards and tool rests must be in good order and securely fixed.
- Loose clothing, long hair and jewellery are dangerous near machinery.
- All safety measures must be adhered to and safety equipment must be used. (Any 2 × 1) (2)

1.4
1.4.1 Occupational health and safety
1.4.2 Personal protective equipment
(2 × 1) (2)

1.5
1.5.1 Water, powder and foam
1.5.2 Powder, foam and carbon dioxide
1.5.3 Powder and carbon dioxide
1.5.4 Dry powder
(4 × 1) (4)

1.6 It is a portable device that discharges a jet of water, foam, gas or other materials to extinguish a fire. (1)

1.7
- Wear appropriate PPE.
- Use the right tool for the job.
- Never carry a power tool by its cord.
- Dress for the job by avoiding loose clothing.
- Regularly inspect tools.
- Ensure that you maintain good balance when operating power tools.
- Disconnect tools when not using them.
- Follow the instructions in the user's manual for lubricating and changing accessories. (Any 5 × 1) (5)

[20]

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QUESTION 2

2.1
- The current flowing through an electrical circuit
- is directly proportional to the voltage applied
- and inversely proportional to the resistance of the circuit. (3)

2.2 2.2.1

$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$ ✓
$\frac{1}{R_p} = \frac{1}{4} + \frac{1}{4}$✓
$\frac{1}{R_p} = \frac{1+1}{4}$✓
$\frac{1}{R_p} = \frac{2}{4}$✓
$R_P = 2\ \Omega$✓ (5)

2.2.2

$V_4 = I_T \times R_4$
$V_4 = 2{,}5 \times 32$✓✓
$V_4 = 80\ V$✓ (3)

2.2.3

$R_T = R_1 + R_P + R_4$
$R_T = 18 + 2 + 32$✓✓
$R_T = 52\ \Omega$✓ (3)

2.2.4

$P = I^2 \times R_P$✓
$P = 2{,}5^2 \times 2$✓✓
$P = 12{,}5\ W$✓

OR

$P = \frac{V^2}{R_P}$✓
$P = \frac{5^2}{2}$✓✓
$P = 12{,}5\ W$✓ (4)

2.3
- Type of material from which the conductor is made
- The length of the conductor
- The cross-sectional area of the conductor
- The temperature of the conductor (4)

2.4 2.4.1

$EMF_T = EMF_1 = 2{,}2$ V✓✓

2.4.2

$r_t = r_1 \div$ number of cells
$= 0{,}5 \div 4$✓
$= 0{,}125\ \Omega$✓

2.4.3

$I_T = EMF \div (R_T + r_t)$
$= (2{,}2) \div (8 + 0{,}125)$✓
$= 0{,}271$ A✓

2.4.4

$V = I_T \times R_1$
$= 0{,}271 \times 5$✓
$= 1{,}355$ V✓

(4 × 2) (8)
[30]

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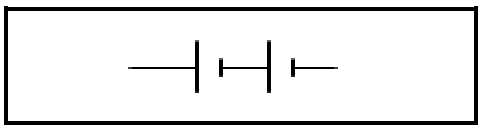
QUESTION 3

3.1 It is a wire or substance that is suitable for carrying electric current. (1)

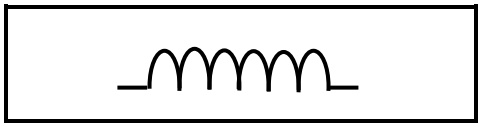
3.2 Manufacture (1)

3.3
- It is to support and/or electrically separate conductors
- in order to prevent the flow of an electric current
- where a potential difference exists between two or more points. (3)

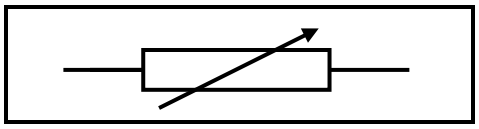
3.4 3.4.1



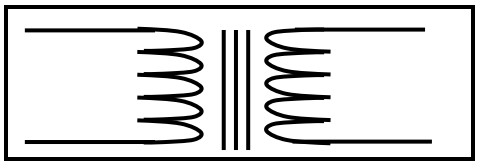
3.4.2



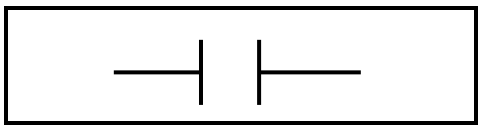
3.4.3



3.4.4



3.4.5



(5 × 2) (10)

3.5 3.5.1 It is a method of wiring to enable one or more lights to be switched on/off from two different points.

3.5.2 It is a method of wiring to enable one or more lights to be controlled from three or more different points.

(2 × 2) (4)

3.6 3.6.1 It detects an earth-fault current and automatically disconnects an installation or circuit from the supply within a specified time when it exceeds a specified or predetermined value.

3.6.2 It protects an installation from transient voltage surges caused by lightning.

3.6.3 It detects overcurrent or a short-circuit current and then automatically disconnects the faulty equipment or circuit from the supply.

(3 × 2) (6)

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3.7 It should:
- Not be in the same room as the appliance
- Not be lower than 0,5 m and not more than 2,2 m from the floor
- Preferably not be above the cooking appliance
- Not be within 3 m of the appliance
- Not be mounted on or in the appliance (5)

[30]

QUESTION 4

4.1
- Main switch and disconnector off
- All switches and MCB's on
- The insulation resistance reading must be at least 1 MΩ
- All lamps out
- All loads disconnected (5)

4.2
- Screw rule
- Right-hand rule (2)

4.3 An EMF is induced in an electric circuit✓ whenever there is a change in the magnetic flux linking with the circuit.✓✓ (3)

[10]

QUESTION 5

5.1 5.1.1 Direct current (DC) is where the current flows in one direction through the circuit. (2)

5.1.2 In an alternating current (AC) the current first flows in one direction and then in the opposite direction. (3)

5.2
- Changes in the sun's intensity
- Volcanic eruptions
- Change in ocean current circulation
- Deforestation and urbanisation
- Carbon dioxide emission through the burning of coal, oil and gas
- Methane and nitrous oxide emissions from the agriculture sector

(Any 5 × 1) (5)

[10]

TOTAL: 100

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