higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

ELECTRICAL TRADE THEORY N1

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This marking guideline consists of 5 pages.

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QUESTION 1

1.1
- Fires
- Injury because of protruding nails, splinters, etc.
- People tripping over loose objects on floors
- Objects falling from above
- People bumping against poorly piled or badly placed materials
- People slipping on greasy, wet or dirty floors (Any 3 × 1) (3)

1.2 An accident is an unplanned event that can result in an injury✓, the loss of life or damage to property or goods. ✓✓ (3)

1.3 1.3.1 They are switches or contacts included in a circuit to ensure safety by causing a circuit to be opened in the event of an incorrect operation.

1.3.2 It is a switch, which in the open position, satisfies the isolating requirements specified for a disconnector.

(Any 2 × 2) (4)
[10]

QUESTION 2

2.1
- Open flames
- Heated surfaces
- Electrical faults
- Friction
- Cigarettes and matches
- Lightning
- Static electricity
- Chemical reactions (Any 5 × 1) (5)

2.2 A power tool requires additional power over and above manual labour. (1 × 2) (2)

2.3
- Clean power tools with a cloth after use.
- Store tools in a clean, dry place.
- Electric cords should be checked before a power tool is used.
- Ensure that the battery is packed according to manufacturer's specification.
- Blades and other cutting accessories should be sharp.
- Tighten components that might have been shaken loose during operation.
- Blow all air vents clean.
- Lubricate according to the instructions in the user manual. (Any 3 × 1) (3)

[10]

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QUESTION 3

3.1 3.1.1 C
3.1.2 B
3.1.3 A
3.1.4 D
3.1.5 E

(5 × 1) (5)

3.2 3.2.1 $R_T = R_1 + R_2 + R_3$
$= 12 + 7 + 5$ ✓
$= 24\ \Omega$ ✓ (2)

3.2.2 $V_T = I_T \times R_T$
$I_T = 120 \div 24$ ✓
$= 5$ A ✓ (2)

3.2.3 $V_1 = I_T \times R_1$ $V_2 = I_T \times R_2$ $V_3 = I_T \times R_3$
$= 5 \times 12$ ✓ $= 5 \times 7$ ✓ $= 5 \times 5$ ✓
$= 60$ V ✓ $= 35$ V ✓ $= 25$ V ✓ (6)

3.2.4 $Q = I^2 \times R \times t$ OR $Q = V \times I \times t$
$= 5^2 \times 24 \times 20$ ✓✓ $= 120 \times 5 \times 20$✓✓
$= 12\ 000$ J ✓ $= 12\ 000$ J ✓
$= 12$ KJ ✓ $= 12$ KJ ✓ (4)

3.3 $R = \frac{\rho \times \ell}{a}$
$= [1{,}725 \times 10^{-8}) \times 30)] \div 12{,}57 \times 10^{-6})$ ✓✓
$= 0{,}041\ \Omega$ ✓ (3)

3.4 Primary and secondary cells both convert chemical energy to electrical energy but primary cells are not rechargeable✓✓ while secondary cells are rechargeable. ✓✓ (4)

3.5 3.5.1 $r = E \div I) - R$
$= 1{,}48 \div 0{,}6) - 2)$ ✓
$= 0{,}467\ \Omega$ ✓

3.5.2 $V = E - IR$
$= 1{,}48 - 0{,}6 \times 0{,}467)$ ✓
$= 1{,}2$ V ✓

(2 × 2) (4)
[30]

QUESTION 4

4.1
- Insulators should be resistant to electrical currents and flashover voltages,
- have a chemical ability to resist corrosion by acid, oils and alkalis,
- be resistant to moisture,
- be mechanically strong to withstand tensile, compressive and shear stresses .

(4 × 1) (4)

4.2 Polycarbonate compounds:
- are transparent and can be coloured
- have a high strength
- are non-corrosive
- are weather resistant
- are ozone friendly
- are non-toxic and combustible

(Any 1 × 1) (1)

4.3
4.3.1 30 A or 40 A
4.3.2 2,5 mm^2
4.3.3 20 A
4.3.4 Lights
4.3.5 60 A or 80 A

(5 × 2) (10)

4.4 4.4.1 When overload occurs, bi-metal strips heat and bend thereby activating the tripping mechanism.✓✓ Magnets play no part.✓✓ (4)

4.4.2 When a short-circuit occurs, the coil produces a large enough magnetic field to activate the tripping mechanism.✓✓✓ Time delays or bi-metals play no part.✓✓ (5)

4.5 4.5.1 A single-phase circuit that supplies luminaires only can supply any number of luminaires. The outer contact of an Edison-screw type lamp holder shall be connected to the neutral conductor.✓✓✓

4.5.2 All water heaters shall be bonded.✓ Dedicated circuits shall be provided for geysers.✓ There may, however, be more than one heater to each circuit.✓

(3 × 2) (6)

[30]

QUESTION 5

5.1
- Insulation resistance test between conductors and earth.
- Insulation resistance test between conductors.
- Earth and bonding continuity test.
- Polarity test.
- Earth leakage protection test.
- Testing the continuity of conductors. (Any 5 × 1) (5)

5.2
- Permanent
- Natural
- Electromagnet (Any 2 × 1) (2)

5.3
- Each line forms a closed loop.
- They will never cross one another.
- The lines in a magnetic field run from the north to the south pole.
- Magnetic lines of force are infinitely elastic and cannot be broken. (4 × 2) (8)

5.4
- Solar energy
- Wind energy
- Hydro energy
- Geothermal energy
- Tidal energy
- Biomass energy (Any 5 × 1) (5)

[20]

TOTAL: 100

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