higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

ELECTRICAL TRADE THEORY N1

2 August 2021

This marking guideline consists of 5 pages.

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QUESTION 1

1.1
- People tripping over loose objects on floors
- Objects falling from above
- People slipping on greasy, wet or dirty floors
- Fires
- Injury due to protruding nails, splinters, etc.
- People bumping against poorly piled or badly placed materials (Any 5 × 1) (5)

1.2
- The guard should provide maximum positive protection.
- It should block access to the danger zone during operation.
- It should be a permanent part of the machine without affecting its structure.
- It should not affect the efficient operation of the machine.
- It should be strong enough to withstand normal wear and tear.
- The guard should be corrosion and fire-resistant.
- The guard should be easily replaceable. (Any 3 × 1) (3)

1.3 It means to open or break a circuit so that it is not electrically continuous. (2)
[10]

QUESTION 2

2.1
- Class A
- Class B
- Class C
- Class D (4)

2.2
- Powder and foam
- Carbon dioxide (Any 1 × 1) (1)

2.3 It is used to cut through metal material as well as thick electric cables.✓ One must ensure that the blade tension is correct✓ and that the teeth are facing forward.✓ Care must be taken to replace broken, cracked or worn blades.✓ The correct blade must be selected for various types of materials to be cut with regard to the number of teeth and hardness.✓ (5)
[10]

QUESTION 3

3.1
3.1.1 True
3.1.2 False
3.1.3 False
3.1.4 True
(4 × 1) (4)

3.2 3.2.1
P = V x I
I = P ÷ V
I = 250÷230 ✓
I = 1,087 A ✓ (2)

3.2.2 $V = IR$
$R = 230 \div 1,087$✓
$R = 211,6\ \Omega$✓

OR

$P = V^2 \div R$
$R = 230^2 \div 250$✓
$R = 211,6\ \Omega$✓

OR

$P = I^2 R$
$R = 250 \div 1,087^2$✓
$R = 211,6\ \Omega$✓ (2)

3.2.3 $Q = Pt$
$= 250 \times (45 \times 60)$✓
$= 675\ 000$ J✓
$= 675$ KJ✓

OR

$Q = I^2Rt$
$= 1,087^2 \times 211,6 \times (45 \times 60)$✓
$= 675\ 000$ J✓
$= 675$ KJ✓ (3)

3.2.4 Total number of hours $= 10 \times 30$
$= 300$ hours✓

KW rating of bulb $= 250 \div 1000$
$= 0,25$ KW✓

Total units of energy $= 0,25 \times 300$
$= 75$ kWh✓

Cost of energy $= 75 \times 182$
$= 13\ 650$c ✓
$= R136,50$ ✓ (5)

3.3 3.3.1 $Emf_T = Emf_1 = 1,5$ V ✓

3.3.2 $r_T = r_1 \div$ number of cells
$= 1,1 \div 4$✓
$= 0,275\ \Omega$✓

3.3.3 $I_T = Emf_T \div (R_T + r_t)$
$= 1, 5 \div (5 + 0,275)$✓
$= 0,284$ A ✓

3.3.4 $V_d = I_T \times r_t$
$= 0,284 \times 0, 275$✓
$= 0,078$ V✓

3.3.5 $V = I_T \times R_T$
$= 0,284 \times 5$✓
$= 1,42$ V✓

3.3.6 $V = I_T \times R_{5\Omega}$
$= 0,284 \times 5$✓
$= 1,42$ V✓

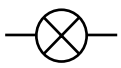
(6 × 2) (12)

3.4 It is the increase in unit resistance of a substance per unit rise in temperature from 0 °C. (2)
[30]

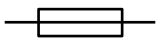
QUESTION 4

4.1
- It is cheaper
- It is naturally waterproof
- It has a higher dielectric strength
- It has a higher tensile strength
- It does not heat up in the sun
- It has a low coefficient of thermal expansion (Any 5 × 1) (5)

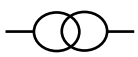
4.2 4.2.1 Lamp/bulb

4.2.2 

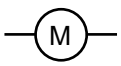
4.2.3 Fuse

4.2.4 

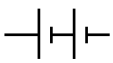
4.2.5 Transformer

4.2.6  **OR** 

4.2.7 Motor

4.2.8 

4.2.9 Battery

4.2.10 

(10)
[15]

QUESTION 5

5.1
- Rooms with two entrances
- Passages
- Double-storey buildings (3)

5.2 So that the full supply voltage will be applied across appliances when they are switched on. (2)

5.3
- Not visible or exposed, so do not pose any hazard to people or animals
- Cannot be vandalised
- Lower maintenance
- Less susceptible to the impact of severe weather
- Suited for places where it is difficult to use overhead lines due to obstructions and dangers presented by the overhead lines. (Any 4 × 1) (4)

5.4
- Using aerial conductors connected to an overhead transmission line.
- Utilizing an underground cable connected to a distribution transformer.
- Using an underground cable connected to an overhead transmission line. (3 × 2) (6)

[15]

QUESTION 6

6.1
- All switches and MCBs on
- All loads disconnected
- Live and neutral bars bridged
- Resistance must be at least 1 MΩ
- Main switch and disconnector off (5)

6.2 It can be made of iron,✓ nickel and cobalt by exposing them✓ to an external magnetic field.✓ (3)

6.3
- North pole
- South pole (2)

6.4 If one holds the coil in the right hand with fingers pointing in the direction of the current,✓✓ the outstretched thumb will point in the direction of the north pole of the electromagnet.✓✓ (4)

6.5
- By increasing the current flow
- By placing an iron core inside the coil (Any 1 × 1) (1)

6.6
- Renewable energy has the advantage that it will never run out
- It has health and environmental benefits
- Less maintenance is required
- Multiple forms of renewable energy exist compared to fossil fuel resources
- It leads to greater energy independence (5)

[20]

TOTAL: 100

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