higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

MATERIAL TECHNOLOGY
NQF LEVEL 3

13 November 2024

This marking guideline consists of 6 pages.

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QUESTION 1

1.1 1.1.1 A
1.1.2 C
1.1.3 D
1.1.4 B
1.1.5 D

(5 × 1) (5)

1.2 1.2.1 Metals that contain✓ iron✓.
1.2.2 Metals that do not✓ contain iron✓.

(2 × 2) (4)

1.3
- Aluminium
- Copper
- Magnesium
- Nickel
- Tin
- Zinc
- Brass
- Bronze
- Lead

(Any 5 × 1) (5)

1.4 1.4.1
- Gears✓
- Roller bearings✓
- Turbine blades subjected to high temperatures✓
- Automotive parts✓ (Any 2 × 1)

1.4.2
- Electroplating ✓
- Forms a continuous, ductile, corrosion-resistant layer✓
- Resistance to corrosion✓
- Used in the construction of cathode-ray tubes or other electronic devices✓
- As an alloying element with many other metals✓ (Any 2 × 1)

1.4.3
- In the manufacture of stainless steel✓
- To hardened steel✓
- To produce several alloys ✓
- To provide a polished mirror finish to steel ✓ (Any 2 × 1)

(3 × 2) (6)

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1.5
- Drilling
- Turning
- Grinding
- Milling
- Shaping
- Planning
- Reaming
- Tapping
- Sawing (Any 5 × 1) (5)

[25]

QUESTION 2

2.1
2.1.1 True
2.1.2 False
2.1.3 True
2.1.4 False
2.1.5 True

(5 × 1) (5)

2.2
- Conduction
- Resistance to heat
- Density
- Brittleness
- Lustre
- Not ductile
- Bad conductors of heat and electricity
- Weak
- Low melting and boiling points
- Soluble in some chemical or organic solvents
- Not sonic (Any 5 × 1) (5)

2.3
A – Tread
B – Sidewall
C – Steel belts
D – Bead (4 × 1) (4)

2.4
- Coal and coke✓ are used as fuels✓
- Charcoal is used to absorb✓ and filter substances, as fuel and in the manufacture of gunpowder✓
- Carbon black is used to make inks✓, carbon paper and paints✓. (3 × 2) (6)

2.5 2.5.1
- Oxygen is a colourless, ✓ odourless, tasteless gas. ✓
- Oxygen is the most important compound✓ in water✓.

2.5.2
- A silvery white, brittle, crystalline solid that has a metallic lustre.
- An amorphous powder that is dark grey to brown.
- The element is not very metallic in character.
- It is a poor conductor of heat and only a fair conductor of electricity.

(Any 2 × 1)
(2 × 2) (4)

2.6
- Styrene-butadiene rubbers
- Ethylene-propylene rubbers
- Butyl rubbers
- Acryl elastomer
- Silicon rubbers (Any 1 × 1) (1)

[25]

QUESTION 3

3.1
3.1.1 C
3.1.2 E
3.1.3 A
3.1.4 G
3.1.5 D

(5 × 1) (5)

3.2 3.2.1
- Can only produce pig iron✓, requiring further refining✓
- Takes a long time to start ✓production when cold✓ (4)

3.2.2
- Does not allow close control✓ of composition✓
- Takes a long time to start✓ production when cold✓ (4)

3.2.3
- Uses normal✓ air instead of oxygen✓
- Old technology✓ no longer in widespread use✓ (4)

3.3
3.3.1 Arc furnace
3.3.2 L-D converter
3.3.3 Rotor furnace

(3 × 1) (3)

3.4
- Improves the machinability of metal
- Helps in cold working
- Improves physical or electrical properties
- Increases stability (Any 3 × 1) (3)

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3.5
- Relief of internal stress.
- Modification of mechanical properties (2)

[25]

QUESTION 4

4.1
4.1.1 bending
4.1.2 surface area
4.1.3 deformation
4.1.4 metal tension
4.1.5 compressive

(5 × 1) (5)

4.2
- To determine the quality✓ of a material✓
- To check for flaws✓ in a material or in a finished component✓
- To measure properties such as hardness✓, ductility and strength✓
- To assess performance✓ of a material in a particular service condition ✓

(Any 3 × 2) (6)

4.3.1 Percentage elongation.

$= \frac{95-80}{80}\ x100\%$ ✓

= 18,75% ✓ (2)

4.3.2 Percentage reduction.

$\frac{16^2-14.5^2}{16^2}\ x\ 100\%$ ✓

= 17,75% ✓ (2)

4.3.3 Strength at yield.

$\frac{55x10^3}{201{,}061\ mm^2}$ ✓

273,55 KPa ✓ (2)

4.3.4 Maximum strength.

$\frac{85x10^3}{201{,}061\ mm^2}$ ✓

422,76 KPa ✓ (2)

4.4	4.4.1	Stress/strain curve or load –extension graph		(1)
	4.4.2	A – Stress B –Yield strength C – Ultimate strength D – Fracture E – Strain	(5 × 1)	(5)
				[25]
			TOTAL:	**100**

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