higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

TOOLMAKERS' THEORY N2

5 December 2023

This marking guideline consists of 6 pages.

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QUESTION 1

1.1 1.1.1 True
1.1.2 False
1.1.3 False
1.1.4 True
1.1.5 False

(5 × 1) (5)

1.2
- Slippery floors
- People not using safety glasses as required
- Unsafe conditions
- Unsafe actions by employees
- Using machines that are not safe
- Using incorrect tools
- Improper storage (Any 5 × 1) (5)

[10]

QUESTION 2

2.1 Improved shock resistance by removing the brittleness in the steel (2)

2.2
- The Bessemer process
- The open hearth process
- The electric arc furnace process (Any 2 × 1) (2)

2.3
- Mild steel
- Medium-carbon steel
- High-carbon steel (3)

2.4
- Axes
- Bolts and nuts
- Parts with very small cross-sectional areas (3)

[10]

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QUESTION 3

3.1

ADVANTAGES	DISADVANTAGES
Rapid test	Multiple test scales needed to cover the full range of metal hardness
Direct readout, no questionable optical measurements required	Conversions between scales can be material-dependent
Non-destructive, parts can be used normally	Samples must be clean and have a smooth test point to get good results

(6)

3.2
- Superficial Rockwell test
- Regular Rockwell test (2)

3.3 The property of a material that enables it to resist plastic deformation, usually by penetration (2)

[10]

QUESTION 4

A − Hole maximum limit
B − Hole minimum limit
C − Hole tolerance
D − Basic size
E − Zero line
F − Shaft tolerance
G − Shaft minimum limit
H − Shaft maximum limit **[8]**

QUESTION 5

5.1
69,3475
- 1,0075 ✓
68,340
- 1,04
67,30✓
- 1,30✓
66,00
- 50,00
16,00✓
- 16,00
00,00✓ (5)

5.2
- Base
- Gauge block
- Holder
- Scriber point (4)

5.3
- Use the blocks at a temperature of 20 °C.
- Do not handle them with your bare hands.
- Clean them with linen cloth before wringing them together.
- Always work over a surface covered in soft timber.
- Never leave the blocks wrung together.
- Clean the gauge blocks after use.
- Place them in a box after use.
- With pack gauges, two outer faces should be protected from wear by two wear blocks. (Any 3 × 1) (3)

[12]

QUESTION 6

6.1
6.1.1 C
6.1.2 D
6.1.3 B
6.1.4 A
(4 × 1) (4)

6.2
- Mild steel
- Hardened steel
- Cast iron (3 × 2) (6)

[10]

QUESTION 7

7.1
- Headless bush
- Screwed bush
- Linear or master bush
- Flange bush (4)

7.2
- Slip type
- Fixed type (2)

7.3
- To drill a hole in a pipe flange or shaft coupling
- To drill a hole through the end of a shaft (2)

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7.4
- Parts will be interchangeable
- Saves time, as no marking has to be done
- Semi-skilled labour can be employed
- Increases production
- Reduces physical fatigue of the operator
- Reduced time in setting of machines and clamping of workpieces
- General machines unsuitable for carrying out certain specific operations can be used (Any 2 × 1) (2)

[10]

QUESTION 8

8.1
- The type of machine
- The procedures
- The type of grinding wheels (3)

8.2
- The first group is used for the machining of hard but brittle material, such as non-ferrous metal.
- The second group is used for the machining of ferrous metal that is tougher and less brittle. (2)

8.3 So that only the cutting edge makes contact with the workpiece (1)

8.4
- Primary clearance angle
- Secondary clearance angle (2 × 2) (4)

[10]

QUESTION 9

9.1 To enlarge and finish holes to accurate dimensions (2)

9.2 A – Drill axis
B − Flute
C − Heel
D − Land
E − Body clearance
F − Shank
G − Body (7)

9.3 Soft and brittle materials (1)

[10]

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QUESTION 10

10.1 Materials that have wear-resistant and shock-resistant properties to prolong their life and reduce cracking (2)

10.2
- The quantity of components to be produced
- Whether the blank material is to be pre-formed or not before the final forging steps
- The forging size and the material to be forged
- The direction in which the component is to be forged (4 × 2) (8)

[10]

TOTAL: 100

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