higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

TOOLMAKERS' THEORY N2

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This marking guideline consists of 6 pages.

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QUESTION 1

1.1 A
1.2 B
1.3 B
1.4 C
1.5 C

(5 × 1) **[5]**

QUESTION 2: SAFETY IN THE WORKPLACE

2.1
- Wear safety glasses.
- Check all controls before switching on the machine.
- See that the floor is free of oil, water or obstructions.
- Keep hands and the body away from moving components.
- Use a brush and not the hands to remove shavings.
- Use a lubricant suitable for the material being cut.
- Make sure the light is correct to see where to work.
- There should be enough ventilation.
- Clamp the workpiece in the clamp provided. (Any 3 × 1) (3)

2.2
- Safety glasses
- Gloves
- Overalls
- Safety shoes
- Earplugs when working with noisy equipment (Any 3 × 1) (3)

2.3
- Check that the handle is not broken.
- The hammer head should fit tightly in the handle.
- Do not use the hammer in the direction of other people.
- Use eye protection.
- Hold the hammer firmly. (Any 2 × 1) (2)

2.4 Lubricants and steel are harmful for one's health and carry germs. (1)

2.5 Only authorised personnel wearing PPE and persons with knowledge of safety regulations (1)

[10]

QUESTION 3: STEEL AND TOOL TYPES

3.1 Iron and carbon (2)

3.2 An alloy is a combination of two or more different metals. (1)

3.3 3.3.1 It gives the material shock-resistance and works against brittleness. Nickel also increases hardness, malleability and corrosion-resistance.

3.3.2 Increases strength and toughness

3.3.3 Increases strength and shock-resistance

(3 × 1) (3)

3.4 High-tensile steel because it consists of nickel and chrome mixed with steel. It can be used for shafts, bolts and nuts and where bending tension is required. (2)

3.5 3.5.1 High-speed steel: Tungsten, chrome and vanadium (cobalt)

3.5.2 Carbide tips: Tungsten, carbon powder, cobalt and hydrogen powder

(2 × 1) (2)

[10]

QUESTION 4: TYPES OF HARDNESS TESTERS

4.1
- It is used to determine the depth of hardness of a material.
- The point can be a round ball or a diamond form.
- The Rockwell number is related to the depth and is bigger for hard materials.
- A number of scales (A, B, C) are used.
- For softer material a 100 kg ball will be used and for harder materials the diamond shape point at a load of 150 kg. (Any 3 × 1) (3)

4.2
- The point is a diamond shape with a square base applied on material at an angle of 136°.
- The numerical value of the hardness number is the load that will be applied divided by the area of the indenting. (2)

[5]

QUESTION 5: GAUGES AND LIMIT SYSTEMS

5.1 5.1.1 The size from where the allowances are allowed to determine the high and low limits

5.1.2 The difference between the low limit and the basic size

5.1.3 The difference between the lower limit of the hole and the higher limit of the shaft

(3 × 1) (3)

5.2 Screw-thread drawing (4)

5.3 Limit-plug gauge drawing (3)

[10]

QUESTION 6: JOHANSSON GAUGE BLOCKS

6.1

81,427	
- 1,007	1st block
80,42	
- 1,02	2nd block
79,4	
- 1,4	3rd block
78,0	
- 3,0	4th block
75,0	
- 25,0	5th block
50,0	
- 50,0	6th block
00,0 mm	

(Any 5 × 1) (5)

6.2 Sinus theta = $\frac{\text{Opposite = Height of gauge blocks}}{\text{Hypotenuse = Length of sinus bar}}$

Sinus 3° 15' = $\frac{\text{Height of blocks}}{250 \text{ mm}}$

Height of gauge blocks = 3° 15' × 250
= 14,173 mm (5)

6.3 Toolmakers' button-setup drawing (5)

[15]

QUESTION 7: GAUGE MANUFACTURING

7.1
- There must be a flat surface along the length of the plug gauge.
- The plug gauge must be square when placing it into a ring.
- Place a small groove about 1 mm from the start of the plug gauge to guide as an indicator for square insertion. (Any 2 × 1) (2)

7.2 Softer material as a liner (1)

7.3 Gauge-manufacturing drawing (5)
[8]

QUESTION 8: CARBIDE CUTTING TOOLS

8.1
- One cutting edge
- Various shapes of points
- Used for turning, drilling, profiling, shaping and grooves
- Strength ability half that of high-speed steel (Any 2 × 1) (2)

8.2 Positive angle, straight angle and negative angle on lathe-cutting tools drawings (3)

8.3
- Loosen the old tip by the screw with an Allen key.
- Remove the broken tip.
- Collect the new tip from the store.
- Clean the surface where the tip must be installed.
- Align the screw and tip into the body of the shaft.
- Tighten the screw. (Any 5 × 1) (5)

[10]

QUESTION 9: CARBIDE CUTTING-TOOL GRINDING

9.1 9.1.1 H – Cast iron, plastic, sanding material, cylinder drilling

9.1.2 N – General use, cast iron, nonmetal products

9.1.3 G – Shaping work of cast iron, wood chisel

(3 × 1) (3)

9.2 9.2.1 Cutting tools
9.2.2 Carbide cutting tools

(2 × 1) (2)

[5]

QUESTION 10: DRILLS

10.1 Drill drawing (5)

10.2
- The included angle should be 118°.
- The two lips should be the same length.
- The two grinded corners should be the same height.
- The angle should be the same at 12°. (Any 2 × 1) (2)

[7]

QUESTION 11

11.1 True
11.2 True
11.3 False
11.4 False
11.5 False
11.6 True
11.7 True
11.8 False

(8 × 1) **[8]**

QUESTION 12

12.1 enough (1)
12.2 standard (1)
12.3 go and no go (2)
12.4 inside (1)
12.5 length, across (2)

[7]

TOTAL: 100

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