higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

FITTING AND MACHINING THEORY N1

2 August 2021

This marking guideline consists of 7 pages.

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SECTION A: GENERAL PRACTICE

QUESTION 1: OCCUPATIONAL SAFETY

1.1 1.1.1 At any mine or works no person shall work in any position from which the slipping or falling of such a person may result in an injury, unless such a person is secured by a lifeline.

1.1.2 No person shall work or be present at or near any place where there is a danger of falling material unless such a person wears a hard hat in good condition approved by the Director-General.

(2 × 1) (2)

1.2 Compressed air should not be used
- if it is likely to cause a harmful amount of dust or
- if it is likely to cause an injury to any person or
- to clean the body of a person or the clothes worn by the person (3)

[5]

QUESTION 2: MEASURING INSTRUMENTS

2.1 2.1.1 Spindle
2.1.2 Anvil
2.1.3 Ratchet
2.1.4 Thimble
2.1.5 Barrel
2.1.6 Spindle lock
2.1.7 Frame

(7 × 1) (7)

2.2
- Setting up workpieces accurately in a machine
- Setting up workpieces prior to marking off
- Test rectangular workpieces for parallelism
- Testing for roundness
- Testing for concentricity
- Testing the limits of size (Any 2 × 1) (2)

2.3
- Taking outside measurements
- Taking inside measurements
- Taking depth measurements (Any 2 × 1) (2)

[11]

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QUESTION 3: SCREW THREADS

3.1 3.1.1
- Pitch is the distance measured axially from a point on one screw thread
- to a corresponding point on an adjacent screw thread.

3.1.2
- Root diameter is the smallest diameter of the tread of the screw or nut.
- It is also known as the core or minor diameter.

(2 × 2) (4)

3.2 D = 0,757 × *p*
= 0,757 × 2,5✓
= 1,893 mm✓ (2)
[6]

QUESTION 4: HAND TOOLS

4.1
- Incorrect and careless use
- Blade too soft
- Blade too hard
- Wrong type of blade (Any 2 × 1) (2)

4.2
- Flat chisel
- Round nose chisel
- Diamond point chisel
- Cross-cut chisel (Any 2 × 1) (2)

4.3 4.3.1 Used to file small, internal radius as well as to enlarge holes (
4.3.2 Used to make sharp, internal corners
(2 × 1) (2)
[6]

QUESTION 5: METALS AND PLASTICS

5.1
- Copper
- Tin
- Lead
- Zinc
- Aluminium (Any 4 × 1) (4)

5.2 5.2.1
- Hardening occurs when steel is rapidly cooled from above 800° C
- by quenching it in cold oil or water, thereby causing a structure change that hardens the steel. (2)

5.2.2
- Tempering occurs when steel is reheated to between 230 °C and 300 °C, depending on the component function,
- and quenched in water or oil. (2)

5.3 5.3.1 Orange
5.3.2 Blue
5.3.3 Grey
5.3.4 White

(4 × 1) (4)
[12]

QUESTION 6: MARKING OFF

6.1 6.1.1
- Scribing of circles and arcs
- Repeating the same dimension
- Transferring dimensions from ruler to workpiece (Any ONE)

6.1.2 Used to mark off centres of holes for drilling

6.1.3 Used to accurately mark out pieces of metal

(3 × 1) (3)

6.2 Angle plate (1)

6.3 To support round workpieces for marking off (1)
[5]

QUESTION 7: KEYS AND KEYWAYS

7.1
- To prevent a component from rotating in its shaft
- while at the same time allow it to slide lengthwise. (2)

7.2 h = D/6
= 60/6✓
= 10 mm✓

w = D/4
= 60/4✓
= 15 mm✓ (4)
[6]

QUESTION 8: FASTENERS

8.1
- Soldering
- Welding (2)

8.2
- screws
- bolts
- nuts
- washers
- split-pins
- circlips
- locking wire
- locking fluid (Any 2 × 1) (2)

[4]

QUESTION 9: HAND TAPS, STOCKS, DIES AND REAMERS

9.1
- Taper tap
- Intermediate tap
- Plug tap (3)

9.2 A taper tap (1)

9.3 It is etched on the tap body (1)

[5]

TOTAL SECTION A 60

SECTION B

QUESTION 10: DRILLING MACHINES

10.1
- Manual feed for small drilling jobs
- Conventional power feed on the spindle
- Power driven arm
- The head can be positioned manually or powered
- Rapid transverse control to quickly reposition the head
- Removable table for heavier work to be clamped to the base (Any 2 × 1) (2)

10.2
10.2.1 Chuck
10.2.2 Side handle
10.2.3 Trigger switch
10.2.4 Hand grip

(4 × 1) (4)

10.3 D = ? mm
S = 20 m/min = 20 × 1 000 = 20 000 mm/min✓
S = π × D × N

$$D = \frac{S}{\pi \times N} \checkmark$$

$$= \frac{20\,000}{3{,}142 \times 220} \checkmark$$

= 28,93 mm✓ (4)
[10]

QUESTION 11: GRINDING MACHINES AND MACHINE CUTTING TOOLS

11.1 11.1.1 Shield
11.1.2 Grinding wheel
11.1.3 Tool rest
11.1.4 Wheel guard
(4 × 1) (4)

11.2
- Bench grinder
- Pedestal grinder
- Angle grinder (3)

11.3
- To support the workpiece
- To prevent the workpiece from jamming (2)

11.4 3 mm (1)
[10]

QUESTION 12: THE CENTRE LATHE

12.1 12.1.1 Compound slide
12.1.2 Tailstock
12.1.3 Lead screw
12.1.4 Carriage
12.1.5 Cross slide
12.1.6 Feed screw
(6 × 1) (6)

12.2
- It transmits motion to the carriage through the apron
- Provides traverse and longitudinal movement to the carriage and the cross slide (2)

12.3
- A wide range of regular and irregular components can be held
- Work can be set to a datum surface
- Work on the end face of a job is possible
- Work can be bored
- Work can be set to run concentrically or eccentrically
- There are no moving parts (Any 2 × 1) (2)

[10]

QUESTION 13: THE MILLING MACHINE

13.1
- Clean the machine after each work period
- Never use an air hose to remove chips
- Be very familiar with the machine before you use it
- Wear proper clothing and approved safety goggles
- Stop the machine before making adjustments
- Stop the machine before removing chips
- Never reach over or near the rotating cutter
- Ensure that the work holding device is mounted solidly to the table and that it is holding the workpiece firmly
- Do not talk to anyone while operating the machine or allow anyone to start the machine for you
- Keep the floor around the machine clear of chips and wipe up spilled cutting fluid immediately
- Place sawdust or oil absorbing compound on slippery floors
- Be thoroughly familiar with the stop lever
- Treat any cut and skin puncture immediately
- Turn off all power to the machine before you open the door to the motor compartment
- Do not run the saddle or work into the column
- Use a heavy cloth for protection when you handle milling cutters

(Any 3 × 1) (3)

13.2
13.2.1 Overarm
13.2.2 Arbor support
13.2.3 Arbor
13.2.4 Saddle
13.2.5 Knee
13.2.6 Elevating screw
13.2.7 Base

(7 × 1) (7)

[10]

TOTAL SECTION B: 40
GRAND TOTAL: 100

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