higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

TOOLMAKERS' THEORY N2

6 APRIL 2018

This marking guideline consists of 6 pages.

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QUESTION 1: OCCUPATIONAL SAFETY

1.1
- The person is working without safety goggles.
- He is holding workpiece with his hands.
- Wooden cut-offs are laying all over the floor.
- The cable is long and bundled on the floor. A person can trip over it.
- The person is sitting while he is busy working.
- He is not wearing an overall while working with electric hand tool.
- He is working close to his leg and that can course an accident and he can cut his leg open.
- Unsafe workshop floor conditions. (Any 5 × 1) (5)

1.2
- Loose-fitting outer clothing
- Jewellery
- Watchstraps and key chains (3)

1.3
- He/she is responsible for the safe installation and proper maintenance, repair and operation of such machinery.
- He/she ensures that all safety appliances, devices and guards are maintained in good and used properly.
- He/she ensures that the provisions of the regulations under this chapter are fully complied with.
- He/she can stop the working of any apparatus or machine, the using of which is, or may in any way be dangerous to persons, due to any defect.

(Any 3 × 1) (3)
[11]

QUESTION 2: STEEL AND TOOL STEEL

2.1
2.1.1 True
2.1.2 True
2.1.3 False
2.1.4 True
2.1.5 False

(5 × 1) (5)

2.2
- Steel
- Nickel
- Chromium (3)

2.3
- Axes
- Bolts and nuts
- Parts with very small cross-sectional areas (3)

2.4 Springs (1)
[12]

QUESTION 3: HEAT TREATMENT AND HARDNESS TESTING

3.1 Normalisation involves heating the steel to a temperature just above the high critical temperature of the steel concerned, followed by cooling in the atmosphere. (1)

3.2
- Refine the steel's grain structure
- Remove tension from the steel
- Obtain a suitable condition for machining and hardening (3)

3.3 Hardness is the property of a material that enables it to resist plastic deformation, usually by penetration. (2)

3.4
- Bending is difficult
- Scratching impossible
- Abrasion or cutting very difficult (3)

3.5
- The Brinell test machine
- The Rockwell test machine
- The Vickers test machine
- The Izod test machine (Any 3 × 1) (3)

[12]

QUESTION 4: LIMITS AND FITS

4.1 A – Tolerance on hole
B – Tolerance on shaft
C – Minimum clearance
D – Maximum clearance (4)

4.2 Deviation is the difference between the actual size and the basic size. (2)

4.3 The zero line is the graphical representation of limits and fits, and it is the straight line to which the deviations refer. (2)

4.4
4.4.1 Clearance fit
4.4.2 Transition fit
4.4.3 Interference fit
4.4.4 Interference fit
4.4.5 Clearance fit

(5 × 1) (5)

[13]

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QUESTION 5: PRECISION MEASURING

5.1
- The gauge blocks should only be used at a temperature of 20 °C.
- Gauge blocks should not be handled with bare hands since body heat may render them inaccurate.
- Clean gauge blocks with a chamois leather or linen cloth before wringing together.
- Always work with gauge blocks over a surface covered with soft timber.
- When using a pack of gauges, the two outer faces should be protected from wear by two wear blocks.
- Never leave gauges wrung together. Slide the gauge blocks apart after use.
- Clean gauge blocks after use and cover with a thin layer of petroleum jelly.
- Replace in box after use. (Any 6 × 1) (6)

5.2
69.3475
-1,0075 ---------- [1]
68,34
-1,04 ---------- [2]
67,3
-1,3 ---------- [3]
66,0
-50,0 ---------- [4]
16,0
-16,0 ---------- [5]
0,0 (5)

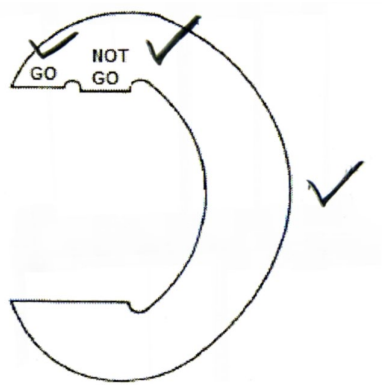
[11]

QUESTION 6: GAUGES

6.1
- Mild steel
- Hardened steel
- Cast iron (3)

6.2 To check the depth of blind holes (1)

6.3



(3)

6.4 No – Aluminium is a soft alloy and will wear very quickly (2)

6.5
- The go side is the low limit dimension and should enter a hole without any difficulty.
- The no go side is the high limit dimension and should not enter a hole. (2)

[11]

QUESTION 7: JIGS AND FIXTURES

7.1
- Parts will be interchangeable.
- Save time as no marking out has to be done.
- Semi-skilled labour can be employed.
- Increase production.
- Reduces physical fatigue of the operator.
- Reduce time in setting of machines and clamping of work-pieces.
- General machines unsuitable for carrying out certain specific operations can be used. (Any 5 × 1) (5)

7.2 Slip bushes are frequently used in jigs where two or more operations that require different inside diameters are done, as when drilling is followed by tapping, reaming, counter boring or spot-facing. (3)

[8]

QUESTION 8: CUTTING TOOLS

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

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

8.3 We grind clearance angles on cutting tools so that only the cutting edge make contact with the work-piece. (1)

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

[8]

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QUESTION 9: DRILLS AND REAMERS

9.1 To cut square corners into work pieces for screw heads (1)

9.2 Soft and brittle materials (1)

9.3
- Sharpening by hand on bench grinder
- Sharpening by device (2)

9.4
- Drills faster
- Lasts longer
- Provides a better quality than one that is grind sharpened by hand (3)

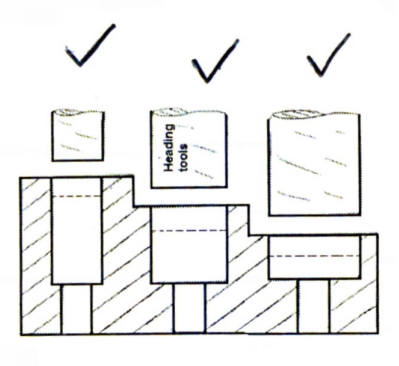
9.5 It is important that the flutes have a leftward spiral (1)

9.6
- Leftward spirals flutes prevent automatic grabbing of the reamer on entry
- Rightward spirals flutes feed into the hole at entry (1)

[9]

QUESTION 10: SINKING AND FORGING

10.1



(3)

10.2 This is the forming of components by heating steel to its correct temperature and then hammering, stamping or pressing it until the required shape is formed. (2)

[5]

TOTAL: 100

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