

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

AUGUST EXAMINATION

FITTING AND MACHINING THEORY N1

21 July 2014

This marking guideline consists of 8 pages.

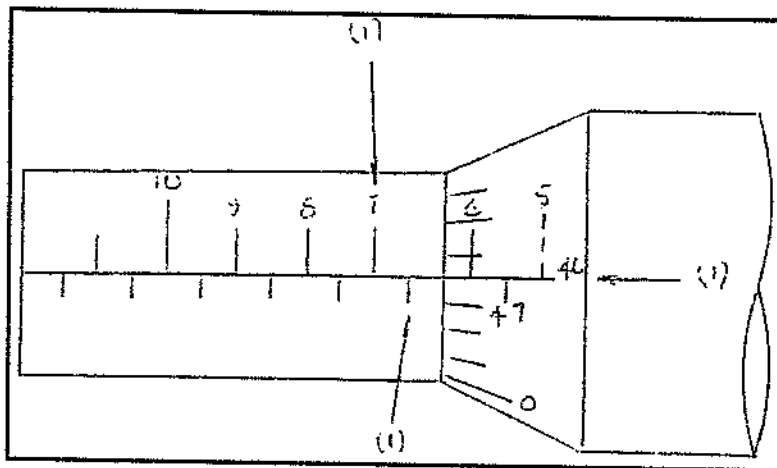
QUESTION 1

- 1.1 Use each tool to do the task it is meant for
 Keep the sharp edges of tools pointed away from you towards the back of your work bench.
 Keep your tools clean , dry and free of oil.
 Take care of your tools, e.g. have a storage place for each tool and service them regularly.
 Never carry tools which have sharp edges in your pocket.
 Do not use your tools incorrectly or carelessly.

OR

- 1.2 No person in a state of intoxication or in any other condition which may render or be likely to render him incapable of taking care of himself or of a person in charge ,shall be allowed to enter the workings of a mine or be in the proximity of any workplace or near any machinery on the surface of a mine or at the works , and any person who may have entered the workings of a mine or who is found in the proximity of any workings in a state of intoxication may be arrested immediately by the manager or some person duly appointed by him and immediately handed over to the police and shall be deemed to be guilty of an offence under these regulations.

(Any 5 x 1)

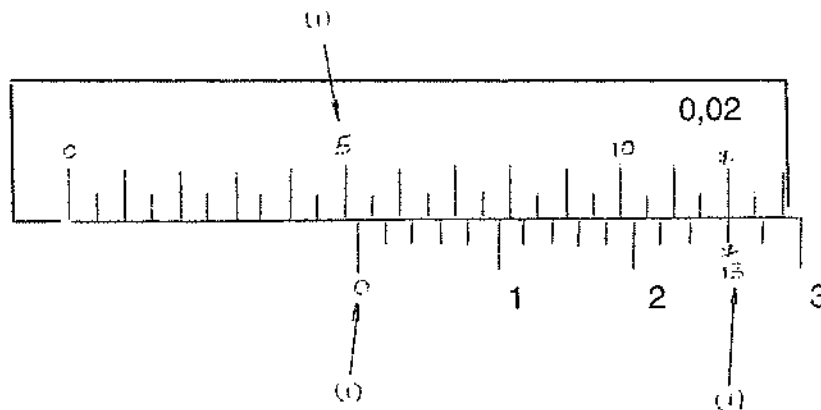
(5)
[5]**QUESTION 2**

- 2.1 Metric depth gauge

(4)

Vernier Calliper gauge (Neatness 1 mark)

(4)



- 2.2
1. Setting up work pieces accurately in a machine.
 2. Setting up work pieces accurately prior to marking off.
 3. Testing rectangular work pieces for parallelism.
 4. Testing for roundness.
 5. Testing for concentricity.
 6. Testing for limits of size.

(Any 2 x 1)

(2)

2.3 0,02 mm

(1)

[11]

QUESTION 3 SCREW THREADS

- 3.1
1. V-Thread 60 degrees
 2. Square thread 90 degrees
 3. Acme thread 29 degrees
 4. Trapezium 45°
 5. V-thread imperials 55°

(3)

- 3.2
- Single start screw thread = is a single helical groove cut in a rod.
 Multi start screw thread = is two or more helical grooves cut in a rod.

(2)

- 3.3
- $$D = 0,613 \times P$$
- $$= 0,613 \times 2,5$$
- $$= 1,53 \text{ mm}$$

(1)

[6]

QUESTION 4 HAND TOOLS

- 4.1
1. The type of cut
 2. The cross-cut profile
 3. The length
 4. The degree of coarseness

(4)

- 4.2
- Extension pieces increase the reach of the socket in difficult areas, deep down a hole or recess where other spanners cannot be used

(1)

- 4.3
- Take up the slack and then two or more complete turns of the wing nut.

(1)

[6]

QUESTION 5 METALS AND PLASTICS

- 5.1 A Aluminium = very light and used for motor vehicle parts.
 B Zinc = corrosion resistant and used on roof sheets
 C Solder = low melting point and used to join electrical wires
 D Stainles steel= difficult to deform by a hammer.
 E Bronz = consists of copper and tin. (5)
- 5.2 Carbon , Manganese , Nickel , Chromium , Vanadium , Tungsten ,
 Kobalt , Molybdenum. (5)
- 5.3
- No need for a lubricant
 - Maintenance free
 - Very light in weight
 - Easily machineable
 - Can withstand a lot of shock.
- (3)
[13]

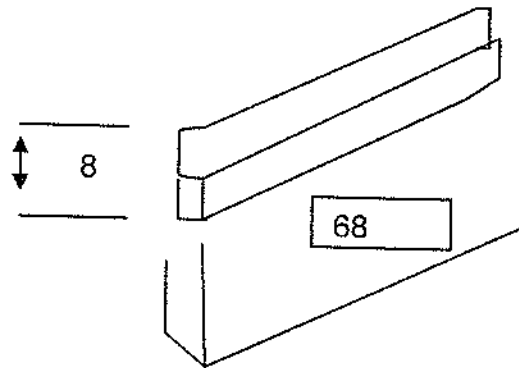
QUESTION 6 MARKING OFF

- 6.1 6.1 To punch dots on the scribed cross lines.
- 6.2 6.2 To scribe horizontal lines on metal.
- 6.3 6.3 To scribe lines on metal with the aid, for example, of a square.
- 6.4 6.4 To support the the workpiece for mark off
- (4 x 1) [4]

QUESTION 7 KEYS AND KEY WAYS

- 7.1
- $$H = \frac{D}{6} = \frac{45}{6} = 7,5 \text{ mm}$$
- $$W = \frac{D}{4} = \frac{45}{4} = 11,25 \text{ mm}$$
- L=1,5D
 =1,5x45
 =67,5 mm
- (3)

7.2

(3)
[6]**QUESTION 8 FASTENERS**

Locknuts
 Castlenut & splitpin
 Tab washer
 Spring washer
 Locking plate
 Star washer

(Any 4 x 1) [4]

QUESTION 9 HAND TAPS , STOCKS , DIES AND REAMERS

A – Circular split die
 B - Two piece rectangular die
 C - Expanding reamer
 D - Adjustable reamer
 E - Hand reamer

[5]

TOTAL SECTION A: 60

SECTION B : MACHINE CUTTING TOOLS AND MACHINES

ANSWER ANY FOUR OF THE FOLOWING QUESTIONS IN THIS SECTION

QUESTION 10

- 10.1
- Must have a clearance angle
 - Angle both sides must be equal (59°)
 - Cutting edges must be of equal length
 - Cutting point must be of same length
 - Web angle must be between cutting 120° - 130°
 - Edge must be sharp
- (Any 3 x 1) (3)
- 10.2 Machine vice
Angle plate
V-blocks
Clamps (3)
- 10.3 The spindle speed can be changed by adjusting the position of the V-belt on the stepped pulleys (1)
- 10.4 $S = \pi d n$
 $N = \frac{S}{\pi D}$
 $= \frac{30}{\pi \times 0.075}$
 $= 682.1 \text{ r.p.m}$ (3)
[10]

QUESTION 11 GRINDING MACHINES AND MACHINE CUTTING TOOLS

- 11.1 The material you have to grind and its hardness
The amount of material you must remove and the finish you require
Whether you have to do wet or dry grinding
The speed of the wheel
The area of the grinding operation
The severity of the grinding operation (Any 5 x 1) (5)
- 11.2 A – Side roughing tool-facing tool
B – Knife tool to cut diameters.
C – Screw cutting tool
D – Grooving tool or parting tool.
E – Parting tool (5)
[10]

QUESTION 12

- 12.1 A – Ram
 B – Tool holder
 C – Clapper box
 D – Tool head
 E – Protractor scale

(5)

- 12.2 Width = 180 mm
 Length of stroke = 320 mm
 Cutting speed = 12 m per stroke
 Feed for rough cut = 3 mm per minute
 Feed for finishing cut = 1,2 mm per stroke
 Stroke ratio = 2 : 1
 Finishing cut time = 4 minutes 48 sec
 Setting up time = 10 minutes

12.2.1

$$\begin{aligned} \text{Strokes per minutes} &= \frac{\text{Cutting speed (m/min x ratio)}}{\text{Length of stroke (m)}} \\ &= \frac{12 \text{ m per minute} \times 2}{0,32 \text{ m} \times 3} \\ &= 37,5 \times 0,667 \\ &= 25,013 \text{ strokes / minutes} \end{aligned}$$

(2)

12.2.2 12.2.2 Rough time = $\frac{\text{width (mm)}}{\text{Feed x strokes per minute}}$

$$= \frac{180 \text{ mm}}{3 \text{ mm/min} \times 25,013}$$

$$= 2,398 \text{ minute}$$

(2)

12.2.3 Total time is 2,398 min + 4,8 min = 7,198 Minutes

(1)

QUESTION 13 CENTRE LATHE

- 13.1 To allow bigger work pieces that can normally not swing over the bed to be machined (1)
- 13.2 A – The centre, to supporting a long work piece
 B – Locking level, to lock spindle
 C – Adjusting screws to move tailstock across its own bed
 D – Handle to turn spindle forward and backwards (4)
- 13.3 When engaged it grips onto the lead screw while cutting screw threads on the lathe.
 Acme thread (2)
- 13.4 The set up time to manufacture one part is a loss
 It is more expensive
 It costs a lot to repair (2)
- 13.5 Pipe centre – used to support pipes, tubes and work pieces with large holes in their ends. (1)
- [10]**

QUESTION 14 MILLING MACHINE

- 14.1 - Wear proper clothing and approved safety goggles
 - Never reach over or near the rotating cutter
 - Keep your eyes focussed on the cutting process
 - Make sure the feed is not too fast (Any 2 x 1) (2)
- 14.2 Spindle – provides drive to the arbor and cutters
 Arbor – drives and holds the cutters in the correct position
 Arbor support – fits and clamps the over arm to align and support the arbor
 Over arm – provides support and correct alignment for the arbor
 Column – Supports and guide the knee vertically
 Table trips – Trip the automatic feed at pre-set positions
 Adjustable footstock – support the work piece on the opposite side of the dividing head
 Bracing arms – provide better support to the arbor and prevents vibration and chatter when heavy cuts are made (8)
- [10]**

TOTAL SECTION B: 40
GRAND TOTAL 100