



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

NOVEMBER EXAMINATION

**MACHINE MANUFACTURING
NQF LEVEL 3**

25 NOVEMBER 2015

This marking guideline consists of 7 pages.

SECTION A**QUESTION 1: MACHINE SAFETY**

- 1.1
- Fixed guards
 - Interlock guards
 - Automatic guards
 - Distance guards
 - Trip guards
- (5 × 1) (5)
- 1.2
- Wearing of a tie/scarf
 - Wearing of jewellery
 - Loose clothing
 - Long hair
- (Any 2 × 1) (2)
- 1.3
- No person should work alone
 - Never lean or sit on machine
 - Use all safety guards and safety equipment provided
 - Don't play fool when operating a machine
 - Never attempt to operate a machine unless trained
 - Never leave a machine unattended in motion
 - Never reach across or into a machine
 - There must be only one operator on a machine at a time
- (Any 4 × 1) (4)
- 1.4 Risk = Probability Rating x Severity Rating
- 1 1
- = 1 (Actual Score)
- OR
- 2 x 1
- = 2 (Maximum Score) (2)
- 1.5
- Position of first aid equipment
 - Position of fire equipment so that the area be cleared
 - Easiest direction to emergency exit
 - A safe route through a workshop
- (Any 2 × 1) (2)
- [15]**

QUESTION 2: COMPUTER-AIDED DRAUGHTING

- 2.1
- Initial expense of hardware can be high
 - Heavy computing power is required
 - Cad packages are expensive and take time to learn
 - Some programmes are expensive
- (Any 2 × 1) (2)
- 2.2
- 2.2.1 No
- 2.2.2 Yes
- 2.2.3 NO
- 2.2.4 Yes
- 2.2.5 Yes
- (5 × 1) (5)
- 2.3
- 2.3.1 Undo – All actions are undone in case of a mistake
- 2.3.2 Move – To move an object from one part of the screen to another location of the screen
- 2.3.3 Scale – An object made longer or smaller
- 2.3.4 Erase – To delete or erase any object
- 2.3.5 Copy – It allows objects to be copied to another part of the screen
- (5 × 1) (5)
- 2.4
- The tapping size drill is either too small or too big
 - If the tap and the tap wrench are not square in the hole that could also cause problems
 - Cutting fluid should be constantly used while tapping
- (3 × 1) (3)

[15]**TOTAL SECTION A: 30**

SECTION B

QUESTION 3: ISO FITS AND LIMITS

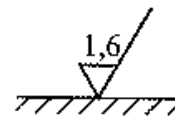
3.1 It is obtained when the diameter of the hole is expanded by heat and the shaft is forced in it and allowed to cool down. (1)

3.2 3.2.1 It is when the hole (female) component is given the basic size and the variation needed is made on the shaft size to obtain a fit.

3.2.2 The shaft is given the basic size and the variation needed is made on a hole to obtain the necessary fit. (2 × 2) (4)

3.3 3.3.1 125
3.3.2 125,00
3.3.3 125,02
3.3.4 0,04 (4 × 1) (4)

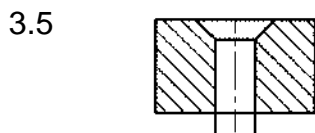
3.4 3.4.1 To show that a work piece must be turned to a surface texture of 1,6 microns.



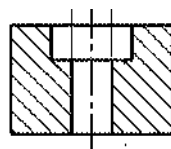
3.4.2 To show that the removal of material is not allowed.



(2 × 1) (2)



countersink



counterbore

(4)
[15]

QUESTION 4: CENTRE LATHE AND MILLING MACHINE

- 4.1
- Drilling
 - Reaming
 - Boring
 - Tapping
 - Setting up work piece with a DTI
- (5 × 1) (5)

- 4.2 Given: $D = 20 \text{ mm} = 20/1000 = 0,02\text{m}$
 $N = 1,5 \text{ rev/s} = 1.5 \times 60 = 90 \text{ r/min}$
- $$V = \pi \times D \times \frac{N}{60}$$
- $$= \pi \times 0,02 \times \frac{90}{60}$$
- $$= 0,094 \text{ m/s}$$
- $$= 5,65 \text{ m/min} \quad (5)$$

- 4.3
- | | |
|-------|-----|
| 4.3.1 | E |
| 4.3.2 | G |
| 4.3.3 | B/A |
| 4.3.4 | F |
| 4.3.5 | H |
- (5 × 1) (5)

- 4.4
- $$S = \pi \times D \times N$$
- $$N = \frac{S}{\pi D}$$
- $$N = \frac{25}{3.142 \times 0.07}$$
- $$N = 113.682 \text{ rev/min}$$
- $$F = f_t \times T \times N$$
- $$F = 0.08 \times 12 \times 113.682$$
- $$F = 109.134 \text{ mm/min}$$
- (5)

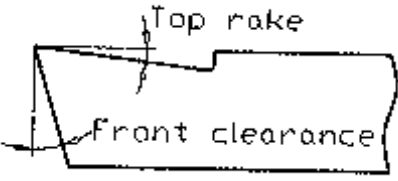
[20]

QUESTION 5: CENTRE LATHE AND MILLING MACHINE

- 5.1
- Universal milling-machine
 - Vertical milling-machine
 - Horizontal milling-machine
 - Turret milling-machine
- (Any 3 × 1) (3)

- 5.2
- Three-jaw chuck
 - Four-jaw chuck
 - Turning between centres
 - By a mandrel
- (Any 3 × 1) (3)

- 5.3
- 5.3.1 Machine table
- 5.3.2 Table movement
- 5.3.3 Magnetic stand
- 5.3.4 Dial test indicator (DTI)
- 5.3.5 Engineers square
- (5 × 1) (5)

- 5.4
- 
- (2)

- 5.5
- Angular Indexing
 - Simple Indexing
 - Rapid Indexing
 - Differential Indexing
- (4 × 1) (4)

- 5.6
- Broken or blunt cutting tool
 - Loose vice or dividing head
 - Play between arbour and the spindle
 - Play between arbour support and arbour
 - Play on the slides of machine table
- (Any 2 × 1) (2)

- 5.7
- One needs to familiarise him/herself with the manufacture's manual.
 - Oil levels must be checked, as well as oiling the slides with hand operated pumps.
 - The conditions of dial gauges and spirit levels if applicable should be checked.
- (4 × 1) (4)

5.8		$\frac{40}{N}$ $= \frac{40}{44}$ $= \frac{10}{11} \times \frac{3}{3}$ $= \frac{30}{33}$	\checkmark \checkmark \checkmark \checkmark \checkmark	
	No (0) complete turns + 30 holes in a 33 hole circle		\checkmark	(5)

5.9		<p>5.9.1 Tilting head</p> <p>5.9.2 Column</p> <p>5.9.3 Knee</p> <p>5.9.4 Base</p> <p>5.9.5 Saddle</p> <p>5.9.6 Table</p> <p>5.9.7 Cutter</p>	(7 × 1)	(7) [35]
		<p>TOTAL SECTION B: 70</p> <p>GRAND TOTAL: 100</p>		