



**higher education  
& training**

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

## **MARKING GUIDELINE**

**NATIONAL CERTIFICATE (VOCATIONAL)**

**NOVEMBER EXAMINATION**

**MACHINE MANUFACTURING  
NQF LEVEL 3**

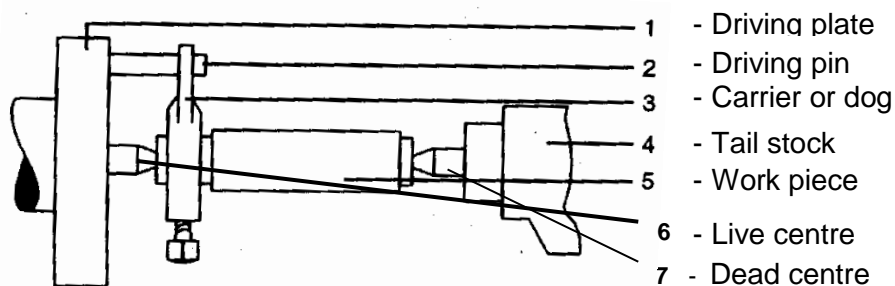
**18 NOVEMBER 2013**

**This question paper consists of 7 pages.**

**QUESTION 1**

- 1.1 The following is the list of centre lathe parts found in a fitting and turning workshop. Rearrange the parts and draw a free-hand sketch showing turning between centre's operation.

Tailstock  
Work piece  
Driving plate  
Carrier or Dog  
Driving pin  
Dead centre  
Live centre



(6)

**(MARK ACCORDING TO SKETCH OR ARRANGEMENT)(6 × 1)**

- 1.2
- Drawing is fast and accurate.
  - Drawing can be upgraded or altered easily.
  - 2D and 3D drawings are made easily.
  - Very suitable for repetitive work
  - Colour is included easily.
  - Drawings can be downloaded directly to a CNC machine saving time
  - Design made in CAD can be manufactured by CAM (Computer Aided Manufacturing)

**(ANY OTHER RELEVANT ANSWER)**

(5)

(Any 5 × 1)

- 1.3
- 1.3.1 Side rake (1)
- 1.3.2 Top rake (1)
- 1.3.3 Front clearance (1)
- 1.3.4 Side clearance (1)

- 1.4 On the Sensitive Pedestal Drilling machine the head, mounted at the top of the pillar, houses the motor and v-pulley which regulates the speed of the drilling machine.

Using the Radial Arm drill, you regulate the speed by a gear box which is connected to the electric motor.

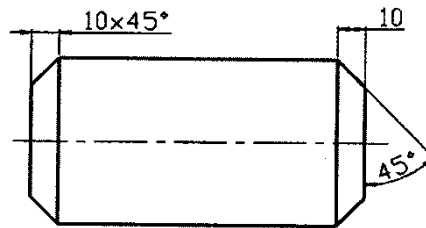
(4)

- 1.5 1.5.1 Fixed steady is a device which is clamped unto the slide ways of the lathe for supporting long shafts while being machined. (2)
- 1.5.2 Travelling steady is bolted to the lathe carriage and moves with it. (2)
- 1.6 1.6.1 The maximum allowance of the fitted parts. (1,13)
- 1.6.2 The tolerance of the shaft. (0,52) (2 x 1) (2)
- [25]**

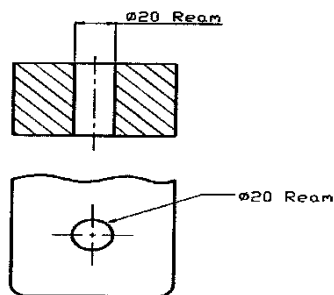
**QUESTION 2**

- 2.1  $V = \pi DN$   
 $N = V / \pi D$
- =  $25 / \pi \times 0,07$   
 = 113,682 r/min
- $F = f \times T \times N$   
 =  $0,08 \times 12 \times 113,682$   
 = 109 mm/min
- (4)

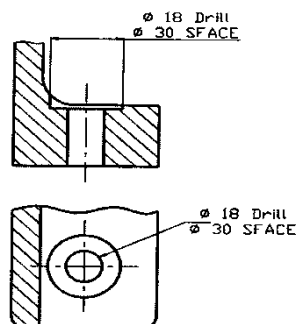
- 2.2 2.2.1 Chamfer



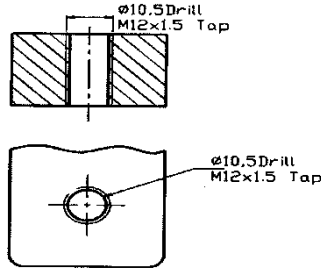
- 2.2.2 Tapping threaded hole



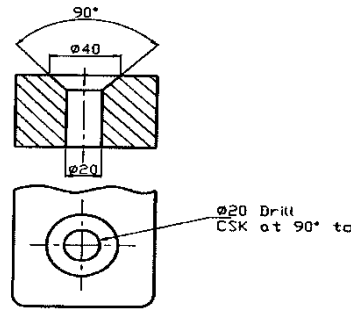
- 2.2.3 Spot facing



2.2.4 Reaming

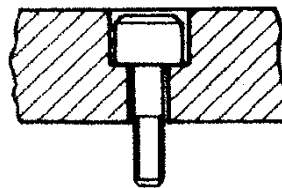


2.2.5 Countersinking



(5 × 1) (5)

2.3 2.3.1



(2)

- 2.3.2
- Counter-bore tool
  - Drill bit 12 mm
  - Drilling machine or Milling machine

(Any 2 × 1) (2)

2.4 **PROBLEM:**

- The drill bit is blunt and too much pressure may cause it to break.
- The drill is clogged up in the hole and causes the drill to get stuck and break.
- The glands of the drill become blunt and may cause the drill to bind into the hole and break.
- Too little coolant used may cause the drill to become blunt.
- The work piece is not clamped correctly.

(Any 2 × 1) (2)

**CORRECTION:**

- Keep drill bit sharp.
- While drilling remove the shavings to avoid any clogging up of the hole.
- Maintain and sharpen drill regularly.
- Ensure that the work piece is always clamped correctly.

(Any 2 × 1) (2)

2.5	2.5.1	Turning between centers		(1)
	2.5.2	Travelling or moving steady		(1)
	2.5.3	1. Carriage 2. Work piece 3. Support 4. Travelling steady 5. Adjuster		(5)
2.6	2.6.1	These are used to mill T-slot grooves in worktables		
	2.6.2	They are used to mill angles such as dovetails in work pieces		
	2.6.3	They are used to mill inside radii and for round shaped milling		
	2.6.4	To remove large amount of material and leave a rough finish		
	2.6.5	It is used to mill slots, facing and profiling		
			(5 × 1)	(5)
2.7	2.7.1	When a number of cutters with varied shapes and sizes are used simultaneously to produce a profile on a job		(2)
	2.7.2	To mill opposite sides of a job so that the two surfaces will be cut parallel		(2)
2.8	A – Heavy Duty Roughing Tool B – Parting Off Tool C – Screw Cutting Tool			(3)
2.9	<ul style="list-style-type: none"> <li>• Simple Indexing</li> <li>• Rapid Indexing</li> <li>• Angular Indexing</li> <li>• Differential Indexing</li> </ul>			(4)
				<b>[40]</b>

**QUESTION 3**

- 3.1    3.1.1    Apron
- 3.1.2    Saddle
- 3.1.3    Cross-slide
- 3.1.4    Tool holder
- 3.1.5    Compound slide
- (5 × 1)    (5)
- 3.2    3.2.1    • Chuck is bulky  
       • Chuck is difficult to set up: needs dial test indicator  
       • Chuck is heavy to handle when being fitted into the lathe gripping  
              is great and fine work can easily be damaged
- (Any 2 × 1)    (2)
- 3.2.2    • A wide range of regular and irregular shapes can be held.  
       • Work can be bored. Jaws are reversible for internal and external  
              work.  
       • Work can be set to run concentrically or eccentrically.
- (Any 2 × 1)    (2)
- 3.2.3    The oil level must be checked every day.
- (1)
- 3.3    D = 100 mm = 0,1 m
- $V = \pi DN$   
        $N = V/\pi D$   
        $N = 29/\pi \times 0.1$   
        $N = 92,3 \text{ r/min}$
- (4)
- 3.4    3.4.1    True
- 3.4.2    False
- 3.4.3    True
- 3.4.4    False
- 3.4.5    False
- (5 × 1)    (5)
- 3.5    • Drilling  
       • Slot and Keyway  
       • Indexing  
       • Helical cutting  
       • Side milling
- (Any 4 × 1)    (4)

3.6	3.6.1	<ul style="list-style-type: none"> <li>• Dirty coolant</li> <li>• Loose particles between the wheel and the work piece</li> </ul>	(Any 1 × 1)	(1)
	3.6.2	<ul style="list-style-type: none"> <li>• Always flush the underside of the guard when changing wheels.</li> <li>• Do not slide the work piece off the magnetic chuck, this will scratch the work piece.</li> </ul>	(Any 1 × 1)	(1)
3.7	3.7.1	When you restore the sharpness of the wheel		
	3.7.2	When you bring the wheel to its original shape	(2 × 1)	(2)
3.8	3.8.1	Advantages: <ul style="list-style-type: none"> <li>• Easy to set-up</li> <li>• Long work piece can be turned.</li> <li>• Easy to remove and replace accurately.</li> <li>• Whole length can be turned.</li> </ul>	(Any 2 × 1)	(2)
	3.8.2	Disadvantages: <ul style="list-style-type: none"> <li>• Difficult to get correct taper when taper turning.</li> <li>• If tailstock not set correctly there is a possibility of the work piece being tapered.</li> </ul>		(2)
3.9	A – Pipe centre			
	B – Half centre			
	C – Ball centre			
	D – Revolving center		(4 × 1)	(4)
				<b>[35]</b>
			<b>TOTAL:</b>	<b>100</b>