



education

Department:
Education
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

**NATIONAL CERTIFICATE (VOCATIONAL)
NQF LEVEL 4**

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FITTING AND TURNING

This memorandum consists of 10 pages.

QUESTION 1 DIAGNOSE AND REPAIR FAULTS ON EQUIPMENT AND MACHINERY DURING PRODUCTION/OPERATION

- 1.1 1.1.1 **E** (1)
- 1.1.2 **A** (1)
- 1.1.3 **B** (1)
- 1.1.4 **C** (1)
- 1.1.5 **D** (1)
- 1.2 **ANY TWO of the following OR any appropriate answer**
- Decrease the working load on the belts
 - Tension the belts to the required specification.
 - Clean the belts and apply special belt dressing.
- (2)
- 1.3 **ANY TWO of the following OR any appropriate answer**
- Minor repairs can prevent major breakdowns
 - Machine down time can be effectively utilised.
 - Time not wasted during minor repairs.
 - Scheduled repairs are better than emergency repairs.
- (2)
- 1.4 **ANY TWO of the following OR any appropriate answer**
- Avoid emergency breakdowns
 - Identify problems and make sound decisions
 - Better production scheduling can be done.
 - Time saved.
 - Cost effective maintenance schedules
- (2)
- 1.5 **NO** (1)
- ANY ONE of the following or any appropriate answer.**
- The operator is not authorised to make the decision.
 - The operator is not qualified to make the decision.
 - The other belts can also break
 - A major breakdown can occur
 - More stoppage time later.
- (1)

- 1.6
- Minor repairs are normally regarded as preventative maintenance and are done in a short period of time.
 - Major repairs require the machine and equipment to be off-line for longer periods of time. (2)

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QUESTION 2 MAINTAIN FLUID POWER AND PNEUMATIC SYSTEMS

- 2.1 2.1.1 **C** (1)
- 2.1.2 **B** (1)
- 2.1.3 **B** (1)
- 2.1.4 **C** (1)
- 2.1.5 **D** (1)

- 2.2 The difference between a hydraulic system and a pneumatic is that a ***hydraulic system uses oil*** and ***the pneumatic system uses air.*** (2)

- 2.3 **ANY TWO of the following**
- To transmit the power in the system
 - To lubricate the moving parts.
 - To protect the parts from corrosion (2)

- 2.4 **ANY TWO of the following**
- Broken or cracked hoses.
 - Broken pipe lines
 - Faulty pipe connections
 - Faulty hose couplings
 - Broken seals (2)

- 2.5 • The ***flow*** of the air or oil. (1)
- The ***pressure*** of the air or oil. (1)

- 2.6 **ANY TWO of the following OR any suitable answer.**

High pressure in the air lines can be dangerous in that:

- The skin and body of a person can be severely damaged when exposed to high-pressure air.
- Mechanical parts that are controlled by air pressure and malfunctions

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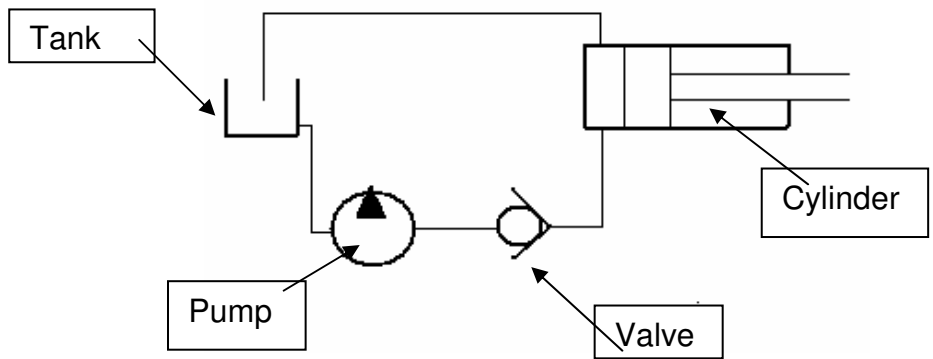
can cause severe damage to the various parts.

- Mechanical parts that are controlled by air pressure and malfunctions can be a danger to the workers in the area. (2)

2.7

Description	Marks
Draw and label the tank	2
Draw and label the pump	2
Draw and label the valve	2
Draw and label the cylinder	2
TOTAL	8

Simple hydraulic system



(8)

2.8 ANY TWO of the following OR any suitable answer.

- For the safety of the workers
 - To avoid damage to the components
- (2)

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QUESTION 3 PRODUCE COMPLEX COMPONENTS USING LATHES

- 3.1 3.1.1 **C** (1)
- 3.1.2 **D** (1)
- 3.1.3 **A** (1)
- 3.1.4 **B** (1)
- 3.1.5 **B** (1)

3.2 **One tick = one mark**

data : S = 90m/min
 D = 40mm or 0,04m

$$S = \pi \times D \times N$$

$$N = \frac{S}{\pi \times D} \quad \checkmark \quad (1)$$

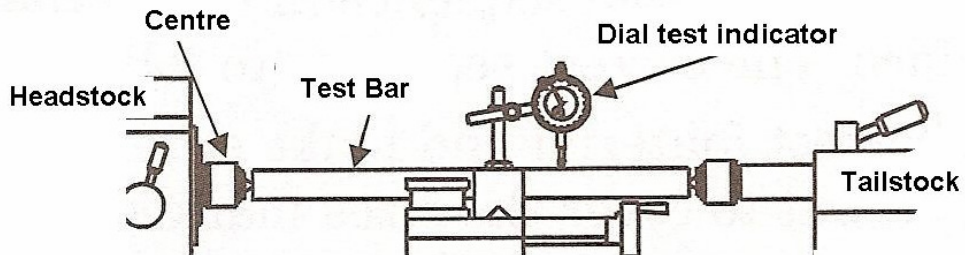
$$N = \frac{90}{3.124 \times 0.04} \quad \checkmark \quad (1)$$

$$N = 720 \text{ r/min} \quad \checkmark \quad (1)$$

- 3.3 3.3.1 Range 19.5 mm to 19.9 mm (1)
- 3.3.2 Drill speed is fast
 Ream size is slow (2)
- 3.3.3 **ANY ONE of the following OR any suitable answer.**
- To obtain smooth finish
 - To avoid breaking the teeth o the reamer
- (1)

3.4

Description	Marks
Show the dial test indicator	1
Show the test bar	1
Show the test bar between centres	1
TOTAL	3



(3)

- 3.5
- Clean the face of the shaft on the lathe. This is to prevent the drill (1)
from drilling off centre.
 - Use a centre drill and countersunk to machine the holes for the lathe (1)
centres.
 - Check whether the centres fit correctly before it is mounted between (1)
the centres.

3.6 The travelling steady provide support in two directions on the work piece (1)
while it is being machined.

3.7 The hairnet prevents the hair from being caught in the moving parts. (1)

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QUESTION 4 PRODUCE COMPLEX COMPONENTS USING MILLING MACHINES

- 4.1 4.1.1 **C** (1)
- 4.1.2 **A** (1)
- 4.1.3 **D** (1)
- 4.1.4 **B** (1)
- 4.1.5 **D** (1)
- 4.2 4.2.1 **TOP SURFACE**
ANY one of the following
- Helical cutter (1)
 - Rose cutter
 - Fly cutter
- SIDE PROFILE**
- Dove –tail cutter (1)
- 4.2.2 • Set the dial test indicator plunger on the top face and zero the dial. (1)
- Move the dial test indicator across the work piece. (1)
- If the dial stays on the zero then the work piece is parallel. (1)
- 4.3 **A TICK = ONE MARK**

DATA

50°

$$\text{Indexing} = \frac{\theta}{9^\circ}$$

$$= \frac{50}{9} \quad \checkmark \quad (1)$$

$$= 5\frac{5}{9}$$

$$= 5\left[\frac{5}{9} \times \frac{54}{1}\right] \quad \checkmark \quad (1)$$

$$= 5 \text{ full turns and } 30 \text{ holes in a } 54 \text{ hole plate} \quad \checkmark \quad (1)$$

CINCINNATI PLATE

- 4.4 **STEP 1** (1)
Move the slot drill until it just touches the side of the round shaft. Set the table dial to ZERO.
- STEP 2** (1)
Move the table down until the cutter clears the top of the shaft.
- STEP 3** (1)
Use the dial to move the cutter to the centre of the shaft.
- The dial is moved over $\frac{1}{2}$ the shaft diameter + $\frac{1}{2}$ the cutter diameter
- 4.5 **CAUSE 1:** The cutting depth is too deep. (1)
- SOLUTION:** Take smaller cuts. (1)
- CAUSE 2:** The centrally fitted cutter not rigid enough during the machining process. (1)
- SOLUTION:** Re-fit the cutter closer to the machine spindle for a more rigid support. (1)
- or**
- Provide the over-arm with machine bracing arms. (1)

[20]

QUESTION 5 PRODUCE COMPLEX COMPONENTS BY PERFORMING INTERNAL AND EXTERNAL GRINDING OPERATIONS

- 5.1 Any **THREE** of the following: (3)
- Wear safety goggles
 - Wear safety boots
 - Wear overall buttoned up
 - Concentrate on your job
 - Avoid hanging clothing
 - Keep the working area clean
- 5.2 Any **THREE** of the following: (3)
- Support the diamond dresser onto the machine table.
 - Apply coolant when necessary, but this must be before the diamond dresser touches the wheel.
 - Touch the dresser to the wheel while revolving in order to obtain the finest point.
 - Dress the wheel by moving the wheel dresser across the face of the wheel.
 - Check that the dressing is properly done before switching off the machine.

5.3	5.3.1	D	(1)
	5.3.2	B	(1)
	5.3.3	A	(1)
	5.3.4	C	(1)
			[10]

QUESTION 6 WRITE SIMPLE COMPUTER NUMERICAL CONTROLLED (CNC) PROGRAMMES AND SET AND OPERATE A CNC MACHINE

6.1 **Absolute programming:** this method is used by making a reference point on the component. This is then identified as the work piece zero. The work piece zero is used as a reference where all the other dimensions are taken from. (2)

6.2 **ANY ONE of the following or any appropriate answer**

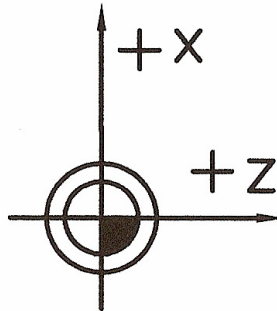
- Any wrong instructions need to be edited to avoid :
- Damage to the machine
- Damage to the components.
- Wrong parts can be produced.
- Poor quality components can be produced (1)

6.3 **ANY ONE of the following OR ANY appropriate answer**

- The **emergency stop button** is used to shut down the machine as soon as the operator finds something is wrong while the machine is in operation.
- The **machine guard** protects the operator from any moving parts.
- **Door lock or switch** can operate automatically or manually to prevent any person from getting in contact with the cutter while it is in operation.
- **Contact mats** that will stop the machine as soon as the operator steps on it.
- **Pneumatic, hydraulic or electro – pneumatic foot operating devices** that allows the operator to stop or start the machine as required. (2)

6.4.1

Description	Marks
Show the + X direction	1
Show the + Z direction	1
TOTAL	2



(2)

6.4.2

Line	Codes	Description
N30	G01 X30.0 Z-25.0	Tool cuts from b to c G01 rapid feed ✓ X 30.0 ✓ Z -25.0 ✓

(3)

[10]

TOTAL: 100