



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

**FITTING AND TURNING
NQF LEVEL 4**

(6011044)

**17 November 2022 (X-paper)
09:00–12:00**

This question paper consists of 6 pages and a formula sheet of 1 page.

475Q1N2217

**TIME: 3 HOURS
MARKS: 100**

INSTRUCTIONS AND INFORMATION




1. Answer all the questions.
 2. Read all the questions carefully.
 3. Number the answers according to the numbering system used in this question paper.
 4. Start each section on a new page.
 5. Use only a black or blue pen.
 6. Write neatly and legibly.
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QUESTION 1: PUMPS AND COMPRESSORS


- 1.1 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.1.1–1.1.5) in the ANSWER BOOK.
- 1.1.1 To create higher pressure at the outlet, impellers are connected in parallel.
- 1.1.2 The seal seat area of the O-ring of the stationary seal face should be lubricated with a soapy water solution or Vaseline.
- 1.1.3 When conducting quality checks and visual inspections, the drive direction should be included as well to ensure that all components are placed according to the specifications.
- 1.1.4 Moisture separators and after-cooler can remove all the moisture from the compressed air.
- 1.1.5 After cleaning and inspecting the complete assembly for possible areas of defects and wear, all the defects must be written down on the job card. (5 × 1) (5)
- 1.2 How will you isolate equipment electrically from other energy sources when working with a pump or compressor? (2)
- 1.3 Why is it important to open a new file and name it, or use an existing file and store information in a safe place? (2)
- 1.4 Explain why pump and compressor parts that are removed for inspection need to be properly cleaned before they are replaced. (2)
- 1.5 Name FOUR types of a rotary pump. (4)
- 1.6 Explain how a single-stage reciprocating compressor works. (5)

[20]

QUESTION 2: HYDRAULIC AND PNEUMATIC SYSTEMS

- 2.1 Name FIVE basic components of the pneumatic system. (5)
- 2.2 Explain the reason for the following: 
- 2.2.1 Reporting defective tools and equipment
- 2.2.2 Compiling a clear and precise hydraulic report
- 2.2.3 Storing equipment in an authorised place
- 2.2.4 Necessity to do visual inspections (4 × 1) (4)
- 2.3 Differentiate between a *hydraulic system* and a *pneumatic system*. (2)
- 2.4 Explain the importance of using the following when maintaining hydraulic equipment: 
- 2.4.1 Correct cleaning agents
- 2.4.2 Use of filter mask and safety glasses
- 2.4.3 Recommended tools and equipment
- 2.4.4 Protective equipment (4 × 1) (4)
- 2.5 List FIVE ways to use pneumatic tools correctly.  (5)
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QUESTION 3: SURFACE GRINDING MACHINES

- 3.1 State the functions of the following grinding wheels:
- 3.1.1 Flaring-cup grinding wheel
- 3.1.2 Dish-cup grinding wheel (2 × 2) (4)
- 3.2 State TWO reasons for conducting quality checks after the component is machined or ground.  (2)
- 3.3 Explain how you will position the workpiece correctly on the surface grinding table. (4)
[10]

QUESTION 4: CENTRE LATHES AND MILLING MACHINES

- 4.1 Explain the function of the following tools and equipment required for a centre lathe operation: ○
- 4.1.1 Face plate
- 4.1.2 Mandrel (2 × 2) (4)
- 4.2 Why should an operator ensure that the centre lathe machine is switched off before loading and unloading a work piece? (2)
- 4.3 List THREE steps that the operator should follow before machining the diameter of a workpiece on a centre lathe. (3 × 2) (6)
- 4.4 Mention THREE situations in which the operator will adjust the calculated revolution per minute (rpm) when machining a component. ○ (3 × 2) (6)
- 4.5 Name TWO milling cutters that can be used to mill the component flat when operating a milling machine. (2)
- 4.6 Explain the reason for using a set of parallels when drilling components on the milling machine. (2)
- 4.7 What is meant by the *tolerance* of the component? (2)
- [24]**

QUESTION 5: CNC CENTRE LATHES AND CNC MILLING MACHINES

- 5.1 Name FOUR types of hearing protection used by an artisan to prevent cumulative hearing damage from loud noises. ○ (4)
- 5.2 Why is it necessary to check safety guards on tool movement when operating CNC machines? (2)
- 5.3 Explain the reason for checking that tool numbers are correctly assigned when working on the CNC machine. (2)
- 5.4 List FIVE safety practices that need to be taken into consideration during the selection of tools. (5)
- 5.5 When selecting a cutting tool, one needs to consider the design requirements of the components. ○
- Mention FOUR design requirements of the component that must be considered when selecting a cutting tool. (4)

- 5.6 Explain the reasons for checking the assigned program zero to the fixture offset when machining a millwright block on the CNC milling machine. (4)
- 5.7 Calculate the rotational speed required in revolution per minute (rpm) for a 25 mm diameter high speed steel (HSS) when cutting machine steel (30 m/min). (3)
- 5.8 Explain why special attention should be given to the condition of the tools and equipment when checking that the machined component surfaces conform to the specifications. (2)

[26]

TOTAL: 100

FORMULA SHEET

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

2. $F = F \times T \times N$

3. $RPM = \frac{m/min \times 318,057}{tool\ diameter}$

4. $MMPT = \frac{m/min}{rpm \times \#FL}$

5. $MMPR(FR) = mm/min \div rpm$

6. $mm/min = rpm \times MMPT \times \#FL$

7. $Indexing\ formula = \frac{40}{N}$

8. $Indexing\ formula = \frac{N}{9^\circ}$

9. $Gear\ ratio = (N - n) \times \frac{40}{N}$