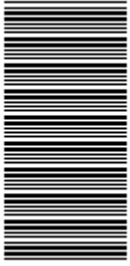


00000000



# higher education & training

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

## **NATIONAL CERTIFICATE (VOCATIONAL)**

**FITTING AND TURNING  
NQF LEVEL 4**

**SUPPLEMENTARY EXAMINATION**

(6011044)

**23 February 2016 (Y-Paper)  
13:00–16:00**

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

**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. ALL drawings must be neat and well balanced
  5. Write neatly and legibly.
-

**QUESTION 1: PUMPS**

- 1.1 Name THREE major groups of pumps. (3)
- 1.2 Name any THREE tasks to be adhered to before working on a pump and prior to disassembly thereof. (3)
- 1.3 It is very crucial to inspect new and re-used pump parts for non-conformances.  
Name THREE reasons for this action. (3)
- 1.4 Why do we need to apply quality checks during the maintenance programme stages? (1)
- [10]**

**QUESTION 2: COMPRESSORS**

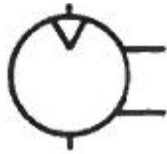
- 2.1 Make a neat sketch of a lobe compressor. Show THREE labels. (3)
- 2.2 Name the function of the following parts in a compressed air system:
- 2.2.1 Air receiver
- 2.2.2 Dryer (2 x 1) (2)
- 2.3 Give TWO reasons for cleaning and inspecting compressors before work is done on them. (2)
- 2.4 Name any FOUR safety practices that must be applied when installing or maintaining compressors. (4)
- [11]**

**QUESTION 3: HYDRAULIC AND PNEUMATIC SYSTEMS**

3.1 State any FOUR safety precautions when working with hydraulic systems and related equipment. (4)

3.2 Identify the following symbols as they are used in pneumatic systems:

3.2.1



3.2.2



(2 x 1) (2)

3.3 Design a simple hydraulic circuit with the FIVE basic components. (5)

3.4 Describe the type of applications that are suitable for:

3.4.1 Hydraulic systems

3.4.2 Pneumatic systems

(2 x 1) (2)

3.5 Explain the function of the following valves in a pneumatic system:

3.5.1 Pressure-relief valve

3.5.2 Variable-flow valve

3.5.3 Exhaust valve

(3 x 1) (3)

3.6 Give the main reason why it is important to report on defective tools and equipment related to hydraulic and pneumatic systems. (2)  
**[18]**

**QUESTION 4: SURFACE GRINDING**

- 4.1 Name the steps you will follow to apply the ring test on a thick grinding wheel. (3)
- 4.2 Make a neat sketch of the following grinding wheels:
- 4.2.1 Flaring-cup grinding wheel
- 4.2.2 Dish grinding wheel (2 x 2) (4)
- 4.3 While you are grinding, you notice that the workpiece has scratches.  
Name TWO possible causes of these scratches. (2)
- 4.4 Explain the purpose of having machine guards on a surface grinder. (1)
- 4.5 An artisan needs to operate a grinding machine and he noticed that the automatic cross feed is not functioning.  
Name TWO reasons for it not functioning. (2)
- [12]**

**QUESTION 5: CENTRE LATHE**

- 5.1 Explain in your own words what is meant by the following statement:  
"Turn the workpiece to a tolerance of  $\pm 0,05$ ". (2)
- 5.2 Name TWO functions of the compound slide. (2)
- 5.3 Explain in your own words what is meant by the following terms as used in turning operations.
- 5.3.1 Chamfering
- 5.3.2 Knurling (2 x 2) (4)
- 5.4 List THREE different types of measuring instruments that is needed to apply quality checks after machining a workpiece on the centre lathe. (3)
- 5.5 During a lathe operation you noticed that the spindle heats up.  
What could be the cause of this? (1)
- [12]**

**QUESTION 6: MILLING MACHINE**

- 6.1 The feed rate of a 40 mm cutter with 6 teeth is 45 mm/min. The feed per tooth of the cutter is 0,08.

Calculate:

- 6.1.1 The revolutions per minute the cutter will make

- 6.1.2 The cutting speed of the cutter in m/min

$$\text{Formulae: } f = F \times T \times N ; S = \pi \times D \times N \quad (2 \times 2) \quad (4)$$

- 6.2 Name any THREE pre-operational checks that should be done on a milling machine. (3)

- 6.3 Use a Cincinnati dividing head to calculate the correct indexing if a milling machine must be used to cut 44 teeth on a gear blank.

Cincinnati index plate:

First side: 24, 25, 28, 30, 34, 37, 38, 39, 41, 42, 43 holes

Second side: 46, 47, 49, 51, 53, 54, 57, 58, 59, 62, 66 holes

$$\text{Formula: Index} = \frac{40}{N} \quad (4)$$

- 6.4 Give TWO reasons for using a helical cutter with nicked teeth. (2)

- 6.5 Explain how you would identify the values for checking a completed component. (1)

**[14]**

**QUESTION 7: CNC TURNING AND MILLING**

- 7.1 List FIVE things you need to consider when cleaning a CNC machine after it was used. (5)

- 7.2 Calculate the depth of cut per tooth required for a 36 mm diameter carbide milling cutter, with 4 flutes, when cutting bronze at 650 r/min. The cutting speed for bronze is given as 50 m/min. (2)

$$\text{Given MMP} = \frac{\text{m/min}}{\text{RPM} \times \text{FL}}$$

- 7.3 Explain the difference between G and M codes in the programming of CNC machines. (4)

- 7.4 Name the THREE different stages of inspection/testing of CNC machined parts that should take place in controlling the quality of a product in the manufacturing process. (3)

- 7.5 Give TWO reasons why it should be necessary to be able to change and edit a programme. (2)
- 7.6 Name the THREE stages when doing programming at an offline workstation. (3)
- 7.7 Give THREE reasons for doing the normal cycle with air-cutting test before actual production can start on a CNC milling machine. (3)
- 7.8 What should be done if a machinist detects any malfunction on a CNC machine during a machining operation? (1)

**[23]**

**TOTAL: 100**

