



# higher education & training

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

## **NATIONAL CERTIFICATE (VOCATIONAL)**

**FITTING AND TURNING  
NQF LEVEL 3**

**NOVEMBER EXAMINATION**

(6011043)

**11 November 2016 (Y-Paper)  
13:00–16:00**

**This question paper consists of 8 pages.**

**TIME: 3 HOURS**  
**MARKS: 100**

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**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. Write neatly and legibly.
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**QUESTION 1: BEARINGS**

- 1.1 You have to check and replace bearings on various machines in the workshop.
- 1.1.1 Name THREE aspects that you must remember when removing bearings. (6)
- 1.1.2 If the bearings are still in the housing and on the shaft you will need to strip the assembly.  
Describe the procedure. (2 × 3) (6)
- 1.2 State THREE common types of damage on rolling type bearings. (3)
- 1.3 Explain the importance of a clean working area when working with bearings. (2)
- 1.4 State any THREE implications when the correct sequencing of activities is not followed during the replacement of bearings in machines and equipment. (3)
- [14]**

**QUESTION 2: COUPLINGS**

- 2.1 Shaft couplings are used in machinery for several purposes.  
State any THREE purposes. (3)
- 2.2 Name the THREE main groups into which couplings are classified. (3)
- 2.3 Name FOUR things that should be looked at during a coupling operation that would indicate that there is something wrong with the coupling. (4)
- [10]**

**QUESTION 3: BRAKES AND CLUTCHES**

3.1 Explain thruster brakes under the following headings:

3.1.1 Working principle

3.1.2 Usage

(2 × 2) (4)

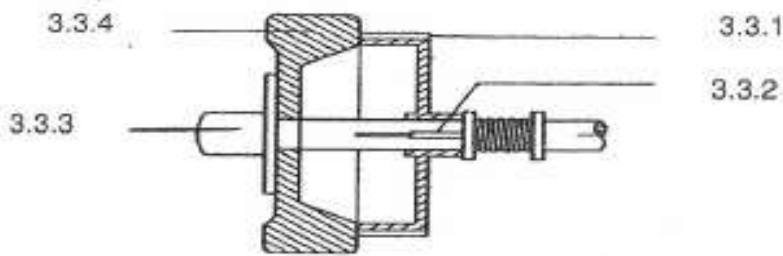
3.2 Explain why it is important to:

3.2.1 Clean the brake and clutch components.

3.2.2 Inspect the brake and clutch components.

(2 × 1) (2)

3.3 Study FIGURE 1 below of a cone clutch and name the parts numbered 3.3.1–3.3.4. Write only the answer next to the question number (3.3.1–3.3.4) in the ANSWER BOOK.



**FIGURE 1**

(4 × 1) (4)  
**[10]**

**QUESTION 4: BELT, CHAIN AND GEAR DRIVES**

4.1 A properly designed machine guard will have certain features.

Name any FOUR features.

(4)

4.2 Explain the meaning of the following V-belt drive terms:

4.2.1 Pulley pitch diameter

4.2.2 Arc of contact

(2 × 1) (2)

4.3 Name THREE reasons for the application of multiple-strand chains. (3)

4.4 Make a neat labelled sketch of an oil-bath lubrication system. (3)

4.5 Copy the table below in the ANSWER BOOK and give TWO advantages and TWO disadvantages of gear drives as compared to chain drives.

ADVANTAGES	DISADVANTAGES

(2 x 2) (4)

4.6 Explain in your own words the differences between simple gear trains and compound gear trains. (2)

[18]

**QUESTION 5: PIPES AND PIPE FITTINGS**

5.1 Explain the difference between thermoplastic piping and thermosetting plastic piping. (2)

5.2 Make a neat labelled sketch of an expansion diaphragm. (3)

5.3 Explain where each of the following fittings would be used in a water pipe system:

5.3.1 90° elbow

5.3.2 T-piece

(2 x 1) (2)  
[7]

**QUESTION 6: VALVES**

6.1 Explain the working principle of a valve. (3)

6.2 An artisan dismantles a valve and wants to do an inspection of the parts for non-conformances.

Name FOUR parts that must be inspected. (4)  
[7]

**QUESTION 7: CENTRE LATHE**

7.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (7.1.1–7.1.3) in the ANSWER BOOK.

7.1.1 To check the external diameter of a work piece to an accuracy of 0,01 mm it is best to use a ...

- A ruler.
- B calliper.
- C vernier.
- D micrometer.

7.1.2 When taper turning, it is best to set the height of the tool's tip to ...

- A the centre of the work piece.
- B 3 mm below the centre.
- C 1 mm above the centre.
- D 2 mm below the centre.

7.1.3 When using the compound slide to taper turn, the tool is fed by ...

- A an automatic feed.
- B engaging the lead screw.
- C hand.
- D turning the tailstock handwheel.

(3 × 1) (3)

7.2 A 50 mm diameter shaft is 250 mm long and is to be machined in a lathe. The cutting speed is 25 m/min.

If a cut is to be made at a feed of 0,5 mm/rev, how long will the cut take?

GIVEN:  $S = \pi DN$        $T = \frac{L}{f \times N}$  (4)

7.3 The centre lathe can be used to perform various types of operations.

Name THREE of these operations. (3)

7.4 State FOUR safety precautions which should be observed when setting up and operating a lathe. (4)

7.5 Explain in your own words what the following tools are used for after completion of a work piece on a lathe:

7.5.1 GO NOGO gauge

7.5.2 Surface texture comparison plate

(2 × 1) (2)

7.6 Define *cutting speed* as applicable to lathe work. (2)

[18]

### QUESTION 8: MILLING MACHINE

8.1 Which cutting fluid is most suitable when machining cast steel? (1)

8.2 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (8.2.1–8.2.3) in the ANSWER BOOK.

8.2.1 The difference between a universal milling machine and a plain milling machine is that ...

- A a plain milling machine does not have an automatic table feed.
- B the table of the universal milling machine can be switched about a point directly below the arbor.
- C gang milling can be done only on a universal milling machine.
- D there is no arbor support on a plain milling machine.

- 8.2.2 Which ONE of the following machining procedures cannot be performed on a milling machine?
- A Gear cutting
  - B Drilling
  - C Cutting a thread
  - D Slitting
- 8.2.3 What is the function of a milling machine tailstock?
- A It supports the work piece whilst cutting gears
  - B It clamps the work piece whilst cutting gears
  - C It clamps the work piece whilst cutting keyways
  - D None of the above
- (3 × 1) (3)
- 8.3 What type of device can be used to drill 10 holes evenly around the circumference of a round work piece? (1)
- 8.4 Describe the general characteristics of high-speed steel milling cutters in comparison with tungsten carbide cutters. (1)
- 8.5 Before working on a milling machine there are certain pre-operational checks that should be done.  
Name FOUR checks. (4)
- 8.6 State FIVE dimensions that must be checked when doing quality checking on a work piece after a milling operation. (5)
- 8.7 Indicate whether the following statement is TRUE or FALSE. Write only 'true' or 'false' next to the question number (8.7) in the ANSWER BOOK.  
Any milling machine operator is allowed to open a machine to check for faults. (1)
- [16]**
- TOTAL: 100**