



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

FITTING AND TURNING NQF LEVEL 2

(6011042)

**21 November 2017 (X-Paper)
09:00–12:00**

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

**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. Write neatly and legibly.
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QUESTION 1: GRINDING AND SHARPENING

- 1.1 Name any THREE items of safety clothing that should be worn before using the pedestal grinder. (3)
- 1.2 Name any THREE bonding materials that are used to bond the abrasive particles in the manufacturing of grinding wheels. (3)
- 1.3 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (1.3.1–1.3.2) in the ANSWER BOOK.
- 1.3.1 A grinding wheel without a proper label containing the wheel markings may be used if, during inspection of the wheel, it looks as if it is in a good condition.
- 1.3.2 A grinding wheel which makes a dull sound during the ring test may be used if the operator of the machine ensures that all machine guards are in place and proper protective clothing is worn. (2 × 1) (2)
- 1.4 Explain the grinding machine term *lock out*. (2)
- 1.5 Name any TWO tests that can be performed in a workshop to identify different types of materials. (2)
- 1.6 Grinding wheels are designed for specific grinding activities. Choose a grinding activity from COLUMN B that matches a grinding wheel in COLUMN A. Write only the letter (A–C) next to the question number (1.6.1–1.6.3) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.6.1	Saucer type	A	commonly used for tool grinding
1.6.2	Straight cup type	B	used for sharpening saws
1.6.3	Flaring cup type	C	used to create flat surfaces

(3 × 1) (3)

- 1.7 1.7.1 Name THREE clearance angles found on lathe cutting tools. (3)
- 1.7.2 Name any TWO rake angles found on lathe cutting tools. (2)

[20]

QUESTION 2: DRILLING MACHINES

- 2.1 Explain why the following drilling operations are done on a work-piece:
- 2.1.1 Countersinking
 - 2.1.2 Counterboring
 - 2.1.3 Spot facing
 - 2.1.4 Centre drilling
 - 2.1.5 Reaming
- (5 × 1) (5)
- 2.2 Explain in your own words the procedure that should be followed to drill through a thin metal plate with a large drill. Refer to the importance of the drill point angle. (3)
- 2.3 If copper has a cutting speed of 35 m/min and the drilling machine is running at 200 r/min, determine the drill size in mm that can be used at that speed. (3)
- 2.4 A work-piece and a drilling machine have been prepared for a drilling operation.
State the steps to be taken before starting the drilling machine. (5)
- 2.5 Give THREE advantages of using a good cutting fluid during drilling operations. (3)
- 2.6 Why is it important to save a report on the drilling operation completed on a work-piece? (1)
- [20]**

QUESTION 3: HAND THREADING AND REAMING

- 3.1 Explain the advantage of multi-start screw threads. (1)
- 3.2 3.2.1 Give TWO examples of the use of a buttress screw thread. (2)
- 3.2.2 Explain why the buttress screw thread is the preferred screw thread to be used in the examples in QUESTION 3.2.1. (1)
- 3.3 Stocks and dies are used to cut external threads.
Name THREE types of dies available. (3)
- 3.4 Explain the purpose of the go/no-go gauges with tapping or reaming operations. (1)
- 3.5 Calculate the drill size for an M10 thread with a pitch of 1,25 mm. (2)
- [10]**

QUESTION 4: KEYS AND FASTENERS

- 4.1 Explain in your own words the purpose of using keys and keyways on rotating shafts. (1)
- 4.2 A shaft with a diameter of 100 mm must be provided with a key and keyway to secure a gear to it.
Calculate the height (h) and width (w) of the key. (4)
- 4.3 Explain the following terms relating to screws and bolts:
- 4.3.1 Shank
- 4.3.2 Shoulder (2 × 1) (2)
- 4.4 Explain the difference between:
- 4.4.1 Machine bolts
- 4.4.2 Stud bolts (2 × 1) (2)
- 4.5 Explain the advantage of using tab washers when securing nuts. (1)
[10]

QUESTION 5: CENTRE LATHE

- 5.1 State FIVE safety rules when doing work on the centre lathe. (5)
- 5.2 Give TWO uses of the tailstock found on a lathe machine. (2)
- 5.3 5.3.1 Name TWO mandrels used on a lathe machine. (2)
- 5.3.2 Explain the purpose of using mandrels during lathe operations. (1)
- 5.4 Explain the purpose of the gap bed found on a gap bed lathe. (1)
- 5.5 Explain the process that needs to be followed to set the compound slide graduated dial to zero. (4)
- 5.6 Name any TWO measuring tools that are used to do quality checking on a work-piece during lathe operations. (2)
- 5.7 Calculate the cutting speed needed to machine a mild steel work-piece with a diameter of 30 mm if the spindle speed is 500 r/min. (3)
[20]

QUESTION 6: MILLING MACHINES

- 6.1 Name the FOUR main types of milling machines. (4)
- 6.2 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (6.2.1–6.2.5) in the ANSWER BOOK.
- 6.2.1 Bevel gears are used to transmit motion between shafts whose axes are at an angle of 90°.
- 6.2.2 An air hose can be used to remove the chips from the machine.
- 6.2.3 Plain and horizontal milling machines are also known as knee-type machines.
- 6.2.4 The functions of bracing arms are to eliminate vibrations during cutting.
- 6.2.5 The arbor is used to move the machine table vertically. (5 × 1) (5)
- 6.3 Calculate the revolutions per minute of a milling cutter which has a diameter of 10 mm to cut aluminium at a cutting speed of 60 m/min. (3)
- 6.4 6.4.1 Explain the term *working tolerance*. (1)
- 6.4.2 A drawing indicates that a work-piece must be cut to a thickness of 20 mm with a tolerance of +/- 0,2 mm.
- Indicate the maximum and minimum sizes allowed on the completed product. (2)
- 6.5 Name any FOUR high-speed steel cutters available for milling operations. (4)
- 6.6 Name the device used to check that the cutting surface finish complies with what is indicated on the drawing of the work-piece. (1)
- [20]**
- TOTAL: 100**

FITTING AND TURNING L2

FORMULA SHEET

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

2. $f = f_t \times T \times N$

3. $w = \frac{D}{4}$

4. $h = \frac{D}{6}$

5. tap drill size = major diameter - pitch

