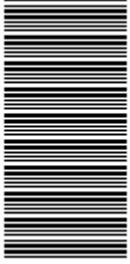


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**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

**FITTING AND TURNING
NQF LEVEL 2**

NOVEMBER EXAMINATION

(6011042)

**21 November 2013 (X-Paper)
09:00–12:00**

This question paper consists of 7 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

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (1.1–1.10) in the ANSWER BOOK.

- 1.1 The correct selection of a grinding wheel will depend on the type of material that needs grinding.
- 1.2 The one advantage of the Huntington wheel dresser over the Diamond-tipped dresser is that it is cheaper.
- 1.3 A pedestal drill must be used to drill a 20 mm diameter hole in a work piece.
- 1.4 Use of too much coolant during a drilling operation can cause the drill bit to break.
- 1.5 When performing a reaming operation, the reamer must be turned clockwise and then anti-clockwise to produce a suitably reamed hole.
- 1.6 The castle nut is regarded as a positive locking nut.
- 1.7 The independent four-jaw chuck used on lathes has only one key socket which operates all four jaws together.
- 1.8 The 'facing' operation on a centre lathe is an operation whereby the diameter of the work piece is turned to size.
- 1.9 When operating a milling machine, it is advisable to get someone to help start your machine for you.
- 1.10 A slot drill may be used on a milling machine to machine a keyway on a shaft.

(10 × 1) [10]

QUESTION 2

- 2.1 Name THREE types of grinding wheels that are used to perform grinding operations. (3)
- 2.2 What is the purpose of the ring test conducted on grinding wheels? (1)
- 2.3 State TWO cases when the dressing of a grinding wheel is necessary. (2)
- 2.4 Explain the procedure to be followed when sharpening a drill bit. (3)
- 2.5 When grinding cutting tools, reference is made to clearance angle and rake angle.
Explain the difference between *clearance angle* and *rake angle*. (4)

[13]

QUESTION 3

- 3.1 What is meant by the following drilling processes?
- 3.1.1 Countersinking (2)
- 3.1.2 Counter-boring (2)
- 3.2 When a hole is drilled in a work piece, the hole should be drilled within certain tolerances.
What is meant by the term *tolerance*? (2)
- 3.3 A 25 mm drill bit is used to drill a hole in a mild steel work piece. The drilling machine is set at 1,5 revolutions per second.
Calculate the cutting speed in metres per minute. (3)
- 3.4 What is the upper and lower limit that the following hole can be drilled to:
 $25^{+0,01}_{-0,02}$ (2)
- 3.5 Two types of drill bits used in drilling operations are the taper-shank and the straight-shank bits.
Explain the difference between these TWO types of bits. (2)
- [13]**

QUESTION 4

- 4.1 Name TWO types of screw threads commonly used on engineering components. (2)
- 4.2 Explain the difference between the following terms:
- 4.2.1 Internal threads
- 4.2.2 Root diameter (2 × 1) (2)
- 4.3 Make a neat drawing of a tapered reamer. (3)
- 4.4 Differentiate between a *hand tap* and a *die nut* in terms of their functions. (2)
- [9]**

QUESTION 5

- 5.1 What is the purpose of a key as a locking device used in engineering industries? (1)
- 5.2 Name TWO types of keys that are used as locking devices. (2)
- 5.3 Name ONE type of screw that produces its own threads. (1)
- 5.4 A pulley must be locked onto a shaft by means of a rectangular key. The diameter of the shaft is 60 mm.
- Calculate the following:
- 5.4.1 The thickness of the key
- 5.4.2 The width of the key
- 5.4.3 The depth that the keyway must be machined into the shaft (3 × 1) (3)
- 5.5 What is the difference between a *rectangular key* and a *feather key*? (2)
- [9]**

QUESTION 6

- 6.1 What is the purpose of mandrels that are used on centre lathes? (1)
- 6.2 Name TWO types of lathe steadies. (2)
- 6.3 State THREE advantages of using a three-jaw chuck on the centre lathe. (3)
- 6.4 State THREE disadvantages of the three-jaw chuck on the centre lathe. (3)
- 6.5 Make neat sketches of each of the following tools that are used on a centre lathe:
- 6.5.1 Round nose tool
- 6.5.2 Finishing tool (2 × 2) (4)
- 6.6 Make neat sketches to show each of the following lathe accessories:
- 6.6.1 A solid centre
- 6.6.2 A half centre (2 × 2) (4)

- 6.7 When checking the quality of work both during and after the turning process, certain measuring instruments are used to check specific dimensions.
- Select any TWO measuring instruments that may be used to conduct the quality checks and indicate what dimension these instruments will be used to check. (4)
- 6.8 When operating a lathe, choose the type of centre that would be used for the following:
- 6.8.1 To support a work piece with large diameter holes
- 6.8.2 To eliminate friction and allow the work piece to be turned at high speed without lubricating it (2 × 1) (2)
- [23]**

QUESTION 7

- 7.1 Name THREE types of milling machines that are used in industry. (3)
- 7.2 Name TWO types of indexing methods. (2)
- 7.3 Name THREE types of cutters that can be used on the milling machine. (3)
- 7.4 State the function of each of the following milling machine components:
- 7.4.1 Spindle
- 7.4.2 Table trips
- 7.4.3 Arbor (3 × 1) (3)
- 7.5 A work piece with a diameter of 30 mm must be machined on a milling machine. The cutter used has 12 teeth and operates at a cutting speed of 15 metres per minute. The feed per tooth is 0,05 mm.
- Calculate the following:
- 7.5.1 The rotational speed of the spindle in revolutions per minute (3)
- 7.5.2 The feed rate in millimetres per minute (2)

7.6 A milling machine is used to cut seven evenly spaced grooves around a shaft.
Calculate the required indexing using a Brown and Sharpe dividing.

The following table reflects the index plates for a Brown and Sharpe dividing head.

Plate 1	15	16	17	18	19	20
Plate 2	21	23	27	29	31	33
Plate 3	37	39	41	43	47	49

(3)

7.7 Explain the difference between *up-cut milling* and *down-cut milling*.

(4)

[23]

TOTAL:

100

FITTING AND TURNING L2

FORMULA SHEET

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

$$F = f_t \times T \times N$$

$$\text{Indexing} = \frac{40}{N}$$

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

$$t = D/6$$

$$w = D/4$$

