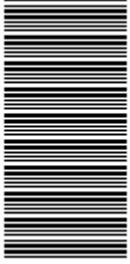


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# higher education & training

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

## **NATIONAL CERTIFICATE (VOCATIONAL)**

**FITTING AND TURNING  
NQF LEVEL 2**

**SUPPLEMENTARY EXAMINATION  
(6011042)**

**23 February 2016 (X-Paper)  
09:00–12:00**

**Calculators may be used.**

**This question paper consists of 7 pages and 1 formula sheet.**

**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: GRINDING AND SHARPENING**

- 1.1 Name THREE precautions that must be considered if a new grinding wheel is fitted to the spindle of a pedestal grinder. (3)
- 1.2 Describe the term *chip breaking*, as applicable to machine cutting tools. (2)
- 1.3 Refer to the TABLE shown in FIGURE 1 (below) and explain the meaning of the following grinding wheel marking:

C 54 – L 4 V (Write each symbol below another in the ANSWER BOOK).

Abrasive	Grit size				Grade			Structure		Bond type
	Coarse	Medium	Fine	Very fine	Soft	Medium	Hard	Dense	Open	
A - aluminium oxide C - silicon carbide	10		70	220	A	I	Q		6	V - Vitrified S - Silicate B - Resinoid R - Rubber E - Shellac
	12	30	80	240	B	J	R	0	7	
	14	36	90	280	C	K	S	1	8	
	16	46	100	320	D	L	T	2	9	
	20	54	120	400	E	M	U	3	10	
	24	60	150	500	F	N	V	4	11	
			180	600	G	O	W	5	12	
				H	P	X				
						Y				
						Z				

**FIGURE 1**

- 1.4 Name any TWO grinding wheel dressers. (2)
- 1.5 A grinding wheel should be tested for cracks:
- 1.5.1 Give the name of the test that is used to check for cracks in a grinding wheel. (1)
- 1.5.2 Explain how the process above is performed to check for cracks in a grinding wheel. (3)
- 1.6 Name TWO tests that can be performed in the workshop to identify different materials. (2)
- 1.7 Name TWO main faults that occur with grinding wheels. (2)

**[20]**

**QUESTION 2: DRILLING MACHINES**

2.1 Make a neat sketch that include each of the following drilling processes as indicated below and explain the function of each in the numbers indicated from QUESTION 2.1.1 to 2.1.4. The cutting tool profile and work piece must be clearly shown in the sketch.

2.1.1 Countersinking

2.1.2 Counterboring

2.1.3 Spotfacing

2.1.4 Reaming

(4 x 3) (12)

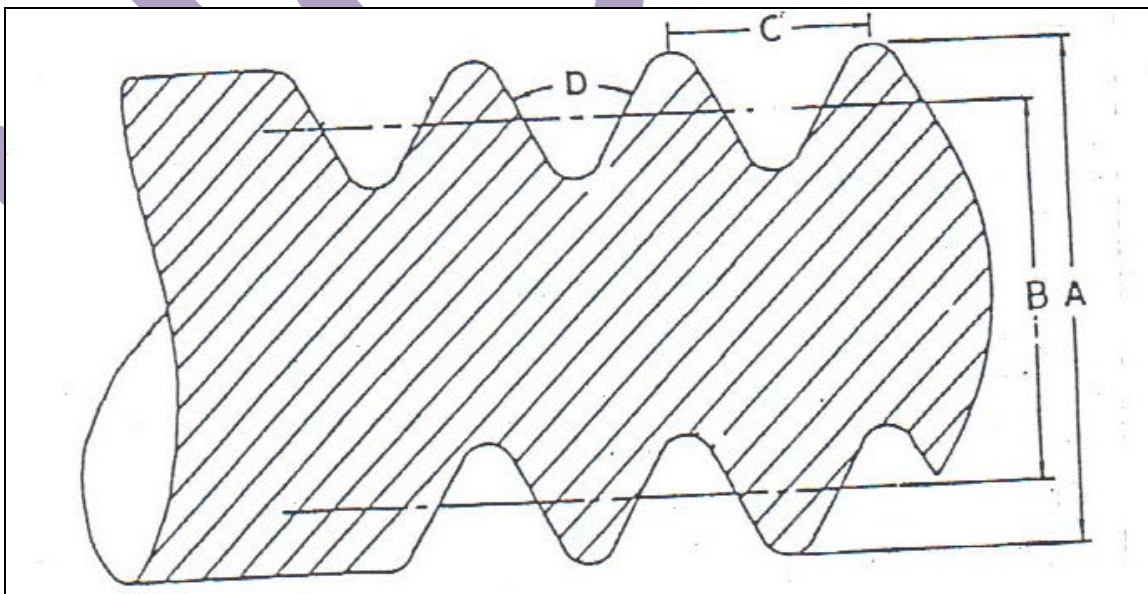
2.2 Your supervisor has asked you to drill a 15 mm hole through a small block of medium carbon steel. The drill rotational speed is set at 400 r/m, determine the cutting speed in m/min. (3)

2.3 List FIVE properties of good cutting oil. (5)

[20]

**QUESTION 3: HAND THREADING AND REAMING**

3.1 Write the correct name of the screw thread shown in FIGURE 2 (below). Write only the answer next to the letter (A–D) in the ANSWER BOOK.



**FIGURE 2**

(4)

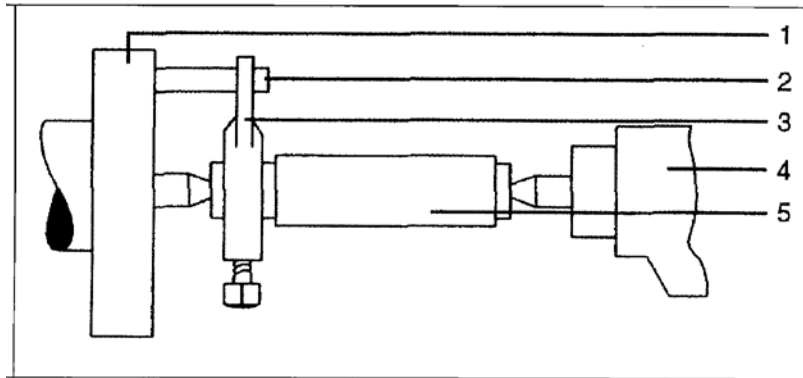
- 3.2 Name THREE types of reamers. (3)
- 3.3 Name TWO types of tap wrenches. (2)
- 3.4 Explain the function of a tap wrench. (1)
- [10]**

#### QUESTION 4: KEYS AND FASTENERS

- 4.1 Make a neat drawing of the following types of keys to distinguish their differences in construction:
- 4.1.1 Rectangular key with square ends
- 4.1.2 Taper gib-head key (2 x 2) (4)
- 4.2 Calculate the height (h) and width (w) of a feather key, if an 84 mm diameter shaft must be keyed to a pulley. (4)
- 4.3 State whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' in the ANSWER BOOK.
- 4.3.1 Allen screws are self-tapping screws.
- 4.3.2 Flat washers spread the tightening load from a nut over a larger area. (2 x 1) (2)
- [10]**

**QUESTION 5: CENTRE LATHE**

5.1 Write the names of the parts of the driving plate as shown in FIGURE 3 below. Write the answers next to the question numbers (1–5) in the ANSWER BOOK.



**FIGURE 3**

(5 x 1) (5)

5.2 Name FOUR types of mandrels. (4)

5.3 Describe the main purpose of the following centre lathe components and accessories:

5.3.1 Tailstock

5.3.2 Chuck

5.3.3 Lead-screw

5.3.4 Compound slide

5.3.5 Carriage

(5 x 1) (5)

5.4 State THREE advantages of the three-jaw self-centring chuck. (3)

5.5 A cast-iron cylindrical work piece is turned on a lathe at a cutting speed of 25 m/min.

If the diameter of the work piece is 60 mm, calculate the rotational speed in revolutions per minute.

(3)  
**[20]**

**QUESTION 6: MILLING MACHINE**

6.1 Name FIVE main uses of a milling machine. (5)

6.2 Copy the following TABLE (as set out below) in the ANSWER BOOK and complete the analysis and possible solutions to the identified malfunctions (a–c) in a milling machine.

MALFUNCTION	ANALYSIS	POSSIBLE SOLUTION
(a) Rough-sounding spindle		
(b) Rough-sounding table movement		
(c) Foul-smelling coolant		

(3 x 2) (6)

6.3 Name TWO measuring instruments you can use to measure the dimensions of a work piece during the machining process. (2)

6.4 A milling cutter is 20 mm in diameter and has 4 teeth. The cutting speed for the material is given as 10 m/min and a feed of 0,04 mm per tooth.

Calculate the feed in mm/min. (6)

6.5 Explain why the head of the OFF button is made larger than the ON button on a milling machine? (1)

[20]

**TOTAL: 100**

**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

