higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1730**(E)**(A8)T

NATIONAL CERTIFICATE

TOOLMAKERS' THEORY N2

(11020202)

8 August 2019 (X-Paper)
09:00–12:00

This question paper consists of 6 pages and 2 addenda.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
TOOLMAKERS' THEORY N2
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. Sketches must be large, neat and fully labelled.
5. Write neatly and legibly.

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QUESTION 1: OCCUPATIONAL SAFETY

1.1 Why is it so important to wear PPE in the workplace? (1)

1.2 What type of PPE would you wear when you work on a bench grinder? (1)

1.3 Explain the reason why all moving parts of machinery must at all times have guards and fences in place during working processes. (1)

1.4 What is the minimum height for machine fences and guard railings? (1)

1.5 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (1.51–1.5.4) in the ANSWER BOOK.

1.5.1 A machine may be oiled while it is in motion.

1.5.2 Adjust the machine of a fellow worker in his/her absence.

1.5.3 Always select the correct tool for a specific job.

1.5.4 A machine can be left unattended while it is in motion.

(4 × 1) (4)
[8]

QUESTION 2: STEELS AND TOOL STEELS

2.1 Identify the THREE groups of steel and the percentage carbon content of each. (3)

2.2 Name the SIX alloying elements in steel. (6)

2.3 Name THREE uses of tungsten in machine tool steel. (3)
[12]

QUESTION 3: HEAT TREATMENT AND HARDNESS TESTING

3.1 Name the TWO types of Rockwell tests. (2)

3.2 What are the minimum and maximum loads in a Rockwell test? (2)

3.3 What are the minimum and maximum loads in the superficial Rockwell test? (2)

3.4 State THREE disadvantages of the Rockwell test. (3)
[9]

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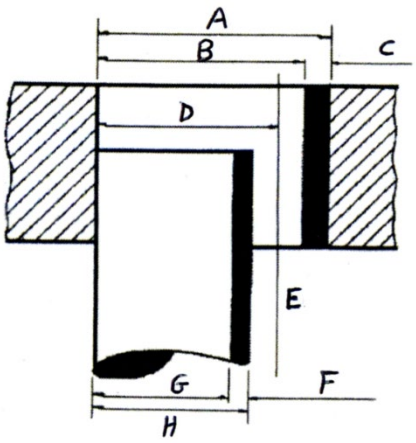
QUESTION 4: LIMITS AND FITS

4.1 Identify the indicated limit and fit terms in the diagram below by writing only the answer next to the letter (A–H) in the ANSWER BOOK.



(8 × 1) (8)

4.2 Explain each of the following terms:

4.2.1 Hole tolerance

4.2.2 Shaft tolerance

(2 × 1) (2)
[10]

QUESTION 5: PRECISION MEASURING

5.1 State SIX ways to handle gauge blocks. (6)

5.2 What is the minimum gauge blocks requirement for a size of 69,3475 mm? (5)
[11]

QUESTION 6: GAUGES

6.1 State FOUR advantages of using gauges. (4)

6.2 Which THREE features should be taken into account when gauges are designed? (3)

6.3 What is the disadvantage of a short 'go' side? (1)

6.4 What is the reason for the flat on a standard plug gauge? (1)

6.5 What is the use of plug gauges? (1)
[10]

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QUESTION 7: JIGS AND FIXTURES

7.1 Make a neat sketch of a hole locator. (3)

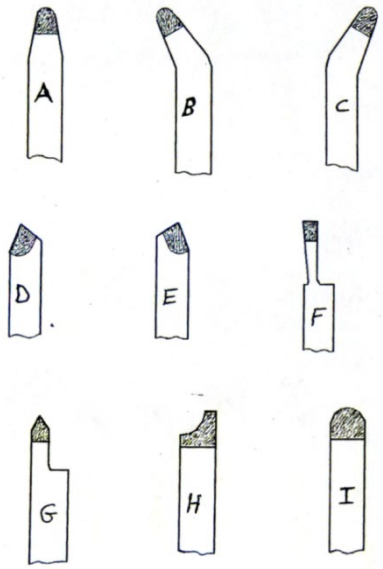
7.2 Name FOUR types of bushes used on jigs. (4)

7.3 Name TWO types of renewable bushes. (2)

7.4 What is the use of a clamp jig? (2)
[11]

QUESTION 8: CEMENTED CARBIDE TIP AND CUTTING TOOLS

8.1 Identify the following cutting tools by writing only the answer next to the letter (A–I) in the ANSWER BOOK.

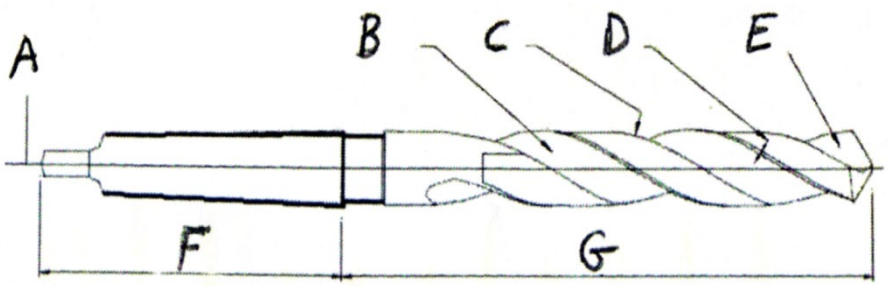


(9)

8.2 What material is used to manufacture cutting tools? (1)
[10]

QUESTION 9: DRILLS AND REAMERS

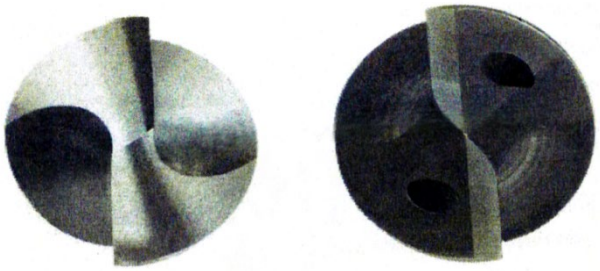
9.1 Identify the indicated parts of the taper HSS drill by writing only the answer next to the letter (A–G) in the ANSWER BOOK.



(7)

9.2 What is the purpose of the TWO holes in a drill point? (1)

9.3 Name the TWO groups of drills below by writing only the answer next to the letter (A–B) in the ANSWER BOOK.



A B

(2)
[10]

QUESTION 10: DIE-SINKING AND FORGING

10.1 Explain *forging*. (2)

10.2 Which FOUR aspects should be considered when manufacturing dies? (4)

10.3 Name THREE properties of the materials used for dye making. (3)
[9]

TOTAL: 100

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6. Table of primary fits (hole basis system) / *Tabel van primêre passings (gatbasisstelsel)*

Nominal sizes *Nominale groottes*		CLEARANCE FITS VRYPASSINGS												TRANSITION FITS OORGANGSPASSINGS				INTERFERANCE FITS STUITPASSINGS			
		Tolerance *Toleransie*		Tolerance *Toleransie*		Tolerance *Toleransie*		Tolerance *Toleransie*		Tolerance *Toleransie*		Tolerance *Toleransie*		Tolerance *Toleransie*		Tolerance *Toleransie*		Tolerance *Toleransie*		Tolerance *Toleransie*	
Over *Oor* mm	To *Tot* mm	H11	c11	H9	d10	H9	e9	H8	f7	H7	g6	H7	h6	H7	k6	H7	n6	H7	p6	H7	s6
		UNIT / *EENHEID* 0,001 mm																			
10	18	+110	-95	+43	-50	+43	-12	+27	-16	+18	-6	+18	-11	+18	+12	+18	+23	+18	+29	+18	+39
		0	-205	0	-120	0	-75	0	-34	0	-17	0	0	0	+1	0	+12	0	+18	0	+28
18	30	+130	-110	+52	-65	+52	-40	+33	-20	+21	-7	+21	-13	+21	+15	+21	+28	+21	+35	+21	+48
		0	-204	0	-149	0	-92	0	-41	0	-20	0	0	0	+2	0	+15	0	+22	0	+35
30	40	+160	-120																		
		0	-280	+62	-80	+62	-50	+39	-25	+25	-9	+25	-16	+25	+18	+25	+33	+25	+42	+25	+59
40	50	+160	-130	0	-180	0	-112	0	-50	0	-25	0	0	0	+2	0	+17	0	+26	0	+43
		0	-290																		

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Please turn over

ADDENDUM B

GAUGE BLOCK SETS

Set No. M105

Range or size (mm)	Increment in mm	No. of pieces
1,01 – 1,49	0,01	49
0,50 – 24,50	0,50	49
25 – 100	25	4
1,0025 – 1,0075	0,0025	3
	Total	105

Set No. M88

Range or size (mm)	Increment in mm	No. of pieces
1,001 – 1,009	0,001	9
1,01 – 1,49	0,01	49
0,5 – 9,5	0,5	19
10 – 100	10	10
1,0005	-	1
	Total	88

Set No. M78

Range or size (mm)	Increment in mm	No. of pieces
1,01 – 1,49	0,01	49
0,50 – 9,50	0,5	19
10, 20, 30, 40, 50, 75, 100	-	7
1,0025 – 1,0075	0,0025	3
	Total	78

Set No. M50

Range or size (mm)	Increment in mm	No. of pieces
1,0025 – 1,0075	0,0025	3
1,01 – 1,09	0,01	9
1,1 – 1,9	0,1	9
1 – 25	1	25
50 – 100	25	3
0,50	-	1
	Total	50

Set No. M45

Range or size (mm)	Increment in mm	No. of pieces
1,001 – 1,009	0,001	9
1,01 – 1,09	0,01	9
1,1 – 1,9	0,1	9
1 – 9	1	9
10 – 90	10	9
	Total	45

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