higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

TOOLMAKERS' THEORY N2

(11020202)

5 December 2023 (X-paper)
09:00–12:00

Drawing instruments and nonprogrammable calculators may be used.

This question paper consists of 7 pages.

270Q1G2305

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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. Use only a black or blue pen.
5. Write neatly and legibly.

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QUESTION 1: OCCUPATIONAL SAFETY

1.1 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.1.1–1.1.5) in the ANSWER BOOK.

1.1.1 The purpose of wearing PPE in the workplace is to protect the body against accidents and danger.

1.1.2 Loose-fitting outer clothing is one type of clothing that workers must wear when they are working close to moving machinery in a tool room.

1.1.3 Safety goggles should not be worn when working on a bench grinder.

1.1.4 One metre is the minimum height for machine fences and guard railings.

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

(5 × 1) (5)

1.2 The image bellow shows a section in the toolmaker's workshop. Study the image and answer the question that follow.



Name FIVE main reasons why accidents occur in the tool room. (5)

[10]

QUESTION 2: STEEL AND TOOL STEEL

2.1 Name the main property when nickel element is added to steel. (2)

2.2 Name TWO processes by which carbon can be removed from cast iron. (2)

2.3 Identify the THREE groups of steel. (3)

2.4 Name THREE uses of tensile steel. (3)

[10]

QUESTION 3: HEAT TREATMENT AND HARDNESS TESTING

3.1 Name THREE advantages and THREE disadvantages of the Rockwell test. (6)

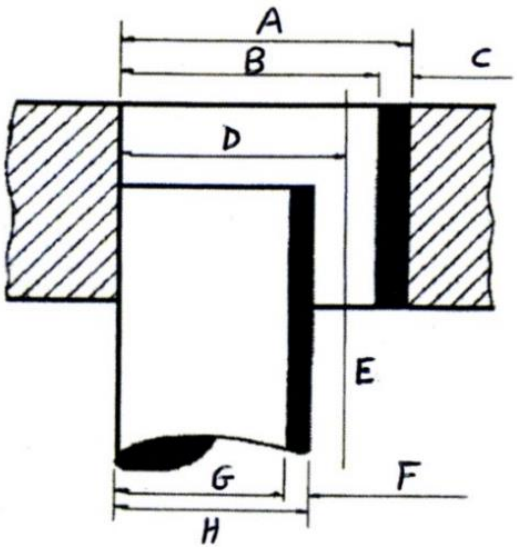
3.2 Name any TWO types of Rockwell tests. (2)

3.3 Describe the term *hardness.* (2)

[10]

QUESTION 4: LIMITS AND FITS

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]

QUESTION 5: PRECISION MEASURING

5.1 Use the data below to determine the minimum gauge blocks needed for a size of 69,3475 mm by using the M50 set.

RANGE/SIZE (mm)	INCREMENTS (mm)	NUMBER OF PIECES
1,0025–1,0075	0,0025	3
1,01–1,09	0,01	9
1,1–1,1,9	0,1	9
1–25	1	25
50–100	25	3
0,50	-	1
		50

(5)

5.2 Name any FOUR parts of the height gauge. (4)

5.3 State THREE ways to handle gauge blocks. (3)

[12]

QUESTION 6: GAUGES

6.1 Choose an item from COLUMN B that matches a description in COLUMN A. Write only the letter (A–F) next to the question number (6.1.1–6.1.4) in the ANSWER BOOK.

COLUMN A		COLUMN B	
6.1.1	Used to check holes	A	short 'go' side
6.1.2	Used to check the depth of blind holes	B	require little skill
6.1.3	Using a gauge	C	plug gauge
6.1.4	Alignment of the bore cannot be checked	D	depth gauge
		E	master gauge
		F	inspection gauge

(4 × 1) (4)

6.2 State THREE materials used to manufacture gauges. (3 × 2) (6)

[10]

QUESTION 7: JIGS AND FIXTURES

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

7.2 Name TWO types of renewable bushes. (2)

7.3 What is the use of a clamp jig? (2)

7.4 State TWO advantages of making use of jigs in the production line in a mechanical press shop. (2)

[10]

QUESTION 8: CUTTING TOOLS

8.1 What are the THREE main factors to consider when grinding a carbide tip tool? (3)

8.2 Give a brief description of the TWO groups of carbide tips tools. (2)

8.3 Why are clearance angles grinded on cutting tools? (1)

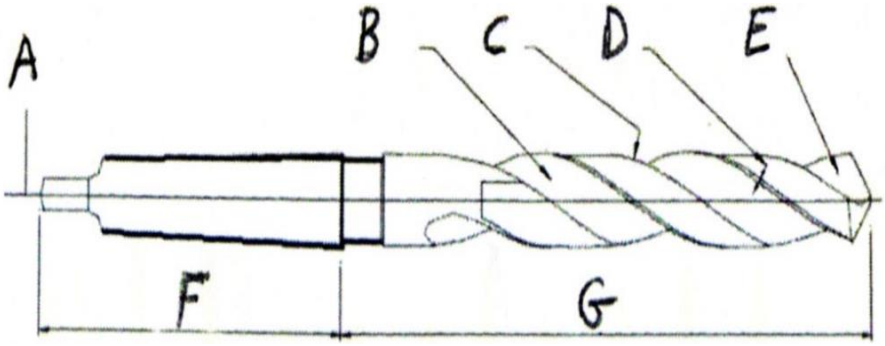
8.4 Name TWO clearance angles on cutting tools. (2 × 2) (4)

[10]

QUESTION 9: DRILLS AND REAMERS

9.1 What is the function of a reamer? (2)

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



(7)

9.3 On which materials would you use step drills? (1)

[10]

QUESTION 10: SINKING AND FORGING

10.1 Name the best material to use when manufacturing dies. (2)

10.2 Name FOUR aspects to consider when manufacturing dies. (4 × 2) (8)

[10]

TOTAL: 100

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