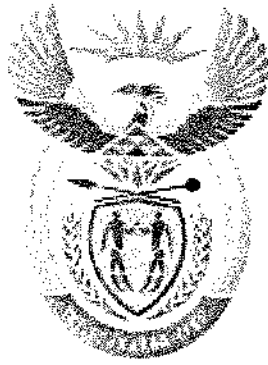


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higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T620(E)(J21)T
AUGUST EXAMINATION

NATIONAL CERTIFICATE

FITTING AND MACHINING THEORY N1

(11021871)

21 July 2014 (Y-Paper)
13:00–16:00

This question paper consists of 8 pages and 1 formula sheet.

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA
NATIONAL CERTIFICATE
FITTING AND MACHINING THEORY N1
TIME: 3 HOURS
MARKS: 100

NOTE: If you answer more than the required number of questions, only the required number of questions will be marked. All work you do not want to be marked must be clearly crossed out.

INSTRUCTIONS AND INFORMATION

1. ALL the questions in SECTION A must be answered, except QUESTION 1 where either QUESTION 1.1 or QUESTION 1.2 must be answered.
 2. Answer any FOUR questions in SECTION B.
 3. Read ALL the questions carefully.
 4. Number the answers correctly according to the numbering system used in this question paper.
 5. All the sketches must be neat, reasonably large and in good proportion.
 6. All sketches must be labelled.
 7. Write neatly and legibly.
-

SECTION A: GENERAL PRACTICE

ALL the questions in this section must be answered, except QUESTION 1, where either QUESTION 1.1 or QUESTION 1.2 must be answered.

QUESTION 1: OCCUPATIONAL SAFETY

- 1.1 Name FIVE safety precautions to bear in mind when using hand tools.
- OR**
- 1.2 Briefly describe the following regulation as applicable to the Minerals Act, 1991 (Act 50 of 1991).

Regulation 4.7.1 Intoxicated person.

[5]

QUESTION 2: MEASURING INSTRUMENTS

- 2.1 Make a neat, enlarged drawing of only the reading of the following measuring instruments:

2.1.1 A metric depth micrometer 6,46 mm

2.1.2 A vernier caliper gauge 5,26 mm

(2 x 4)

(8)

- 2.2 State TWO practical uses of a dial test indicator.

(2)

- 2.3 Name the degree of accuracy of a vernier height gauge.

(1)

[11]

QUESTION 3: SCREW THREADS

- 3.1 In practice various types of screw threads are used for specific purposes.

Name THREE of these different screw threads known to you and also name the included angle of each.

(3)

- 3.2 Explain the difference between a single-start screw thread and a multi-start screw thread.

(2)

- 3.3 Calculate the depth of M20 x 2,5 screw thread, M20 being the diameter and 2,5 being the pitch in millimetres

(1)

[6]

QUESTION 4: HANDTOOLS

4.1 When you buy a new file, you must name the characteristics of that specific file. It is called the classification of a file.

State the FOUR classification factors.

(4)

4.2 What advantages does the extension piece give the socket and the ratchet wrench?

(1)

4.3 Explain how the tension is adjusted on a hacksaw blade.

(1)

[6]**QUESTION 5: METALS AND PLASTICS**

5.1 Choose a description from COLUMN B that matches a metal item in Column A. Write only the letter (A–F) next to the question number (5.1.1–5.1.5) in the ANSWER BOOK.

| A=METALS | | B=COMPOSITION, PROPERTIES & USES |
|-----------------|-----------------|--|
| 5.1.1 | Aluminium | A. difficult to deform with a hammer |
| 5.1.2 | Zinc | B. consist of copper and tin |
| 5.1.3 | Solder | C. very light and used for motor vehicle parts |
| 5.1.4 | Stainless steel | D. corrosion resistant and used on roof sheets |
| 5.1.5 | Bronze | E. low melting point and used to join electrical wires |
| | | F. high tensile strength and is light |

(5)

5.2 Give FIVE alloying elements that can be added to steel to give it a specific property.

(5)

5.3 We use nylon in engineering because it has specific properties.

Name THREE of these properties.

(3)

[13]

QUESTION 6: MARKING OFF

Explain the function of the following marking-off equipment

- 6.1 Dotting punch.
- 6.2 Heigh gauge
- 6.3 Scriber
- 6.4 Angle plate.

(4 x 1) [4]

QUESTION 7: KEYS AND KEYWAYS

7.1 Calculate the height, the width and the length of a feather key, when a 45 mm diameter shaft must be keyed to a pulley. (3)

7.2 Draw a neat drawing of the above calculated feather key with its dimensions. (3)

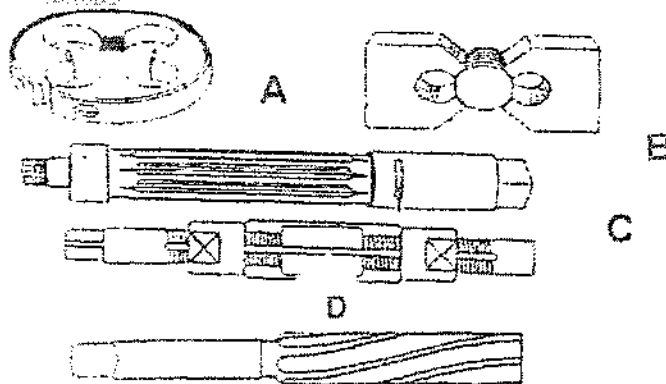
[6]

QUESTION 8: FASTENERS

Name FOUR locking methods for nuts, where vibration is present. [4]

QUESTION 9: HAND TAPS, STOCKS AND DIES AND REAMERS

Study FIGURE 1 below and label the parts by writing down the names of the different types of dies and reamers used in industry, next to the letters (A–E) in the ANSWER BOOK.



E
FIGURE 1

TOTAL SECTION A: [5]
60

SECTION B: MACHINE CUTTING TOOLS AND MACHINES

Answer any FOUR questions in this section

QUESTION 10: DRILLING MACHINES

- 10.1 Describe THREE factors of a drill point, to be taken into account to perform a drilling operation efficiently. (3)
- 10.2 Name THREE methods that can used to clamp a work piece on a drilling machine table. (3)
- 10.3 Briefly describe how the spindle speed on the sensitive drilling machine can be changed. (1)
- 10.4 The following details are known to an apprentice:
 The drill diameter - 14 mm
 The number of holes to be drilled – 6
 The cutting speed of steel is 30 m/min.
 Calculate the spindle speed in revolutions per min to drill the six holes. (3)
[10]

QUESTION 11: GRINDING MACHINES AND MACHINE CUTTING

- 11.1 State FIVE factors to be considered before selecting a grinding wheel for a specific job. (5)
- 11.2 FIGURE 2 indicates certain centre lathe cutting tools. Write down the names of each cutting tool next to the letters (A--E) in the ANSWER BOOK.

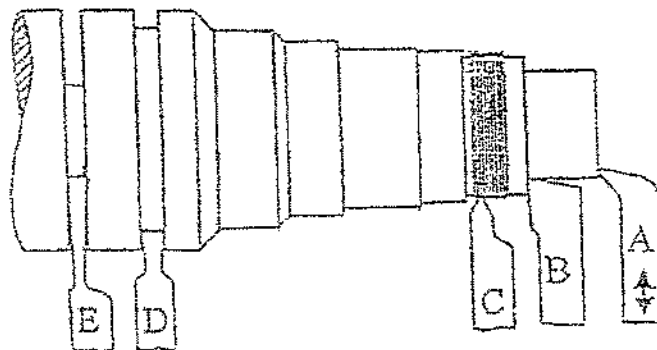


FIGURE 2

(5)
[10]

QUESTION 12: SHAPING MACHINES

- 12.1 Study FIGURE 3 below and label the parts by writing down the names of the components of the Ram head next to the letters (A–E) in the ANSWER BOOK.

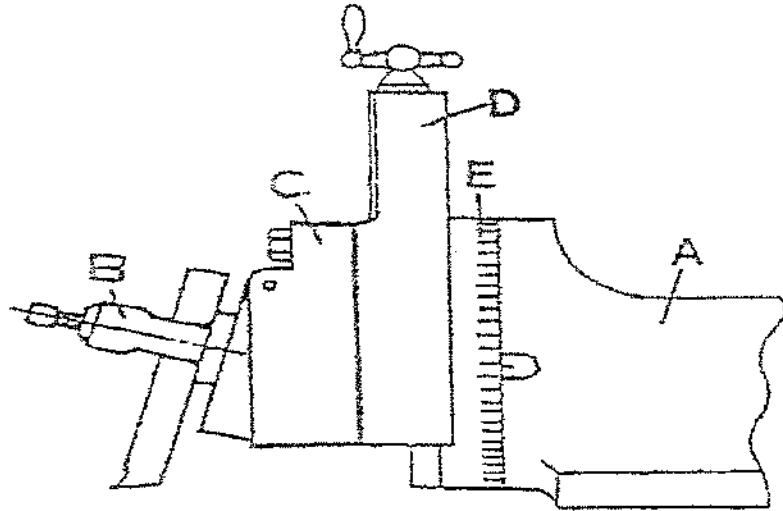


FIGURE 3

(5)

- 12.2 You are given a task to machine a cast iron base, 295 mm long x 180 mm wide on a shaping machine in the machine shop. The following details are given to you:

- Stroke length for the for the work piece = 320 mm
- Cutting speed for the material = 12 m per minute
- Feed for roughing cut = 3 mm per stroke
- Feed for finishing cut = 1,2 mm/stroke
- Stroke ratio = 2:1
- Finishing cut time = 4 minutes 48 seconds
- Setting up time = 10 minutes

Calculate the following:

- 12.2.1 The strokes per minute (2)
- 12.2.2 The roughing cut time (2)
- 12.2.3 The total time to complete the work piece (1)

[10]

QUESTION 13: CENTRE LATHE

- 13.1 Describe the purpose of a gap bed on a centre lathe in the machine shop. (1)
- 13.2 Study FIGURE 4 below and label the parts of the tail stock of a centre lathe by writing down the names next to the letters (A–D) in the ANSWER BOOK

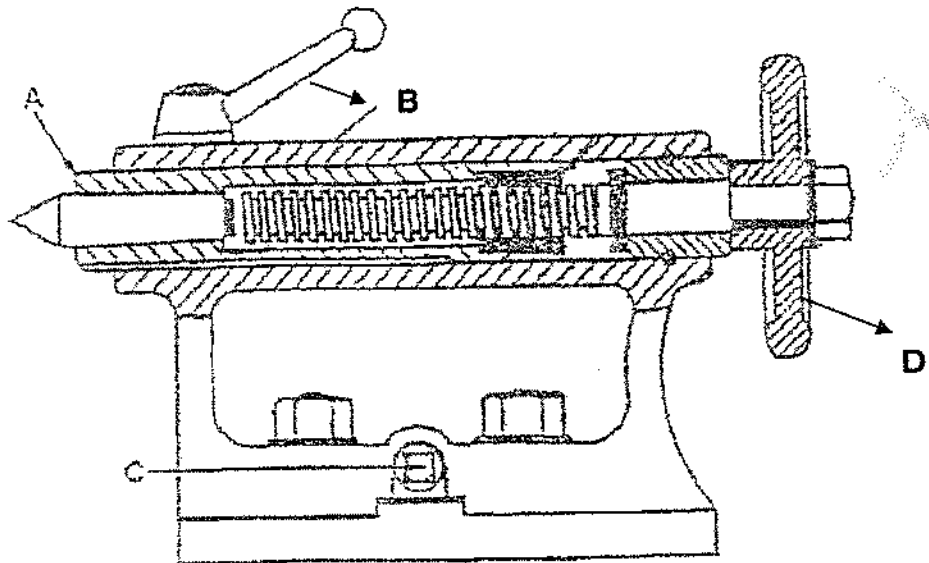


FIGURE 4

- 13.3 State the purpose of the half nut and name also the type of screw thread it is made up of when using the centre lathe. (2)
 - 13.4 State TWO disadvantages of the CMC lathe compared to the conventional lathe in a machine shop. (2)
 - 13.5 State ONE function of a pipe centre as used on a centre lathe. (1)
- [10]**

QUESTION 14: THE MILLING MACHINE

- 14.1 State TWO safety precautions applicable when working on a milling machine. (2)
- 14.2 Name FOUR components you would find on a milling machine and describe the function of each. (8)

[10]

TOTAL SECTION B: 40
GRAND TOTAL: 100

FITTING AND MACHINING THEORY N1**FORMULA SHEET**

Any applicable formula may also be used.

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

2. $w = \text{feed/stroke} \times \text{strokes/min} \times t$
 $w = \text{toevoer/slag} \times \text{slae/min} \times t$

3. $\text{Strokes/min} = \frac{S}{\text{Length of stroke}} \times \text{Ratio}$

$$\text{Slae/min} = \frac{S}{\text{Lengte van slag}} \times \text{Verhouding}$$

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

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