higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T620**(E)**(N11)T

NOVEMBER EXAMINATION

NATIONAL CERTIFICATE

FITTING AND MACHINING THEORY N1

(11021871)

11 November 2014 (Y-Paper)
13:00–16:00

This question paper consists of 10 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 from SECTION B.
3. Read ALL the questions carefully.
4. Number the answers 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 1.1.1 Name THREE methods which you will apply to promote safe working conditions in a workshop. (3)

1.1.2 State TWO reasons for wearing gloves in a machine workshop. (2)
[5]

OR

1.2 Briefly answer the following questions as applicable to Regulation 4.4.1 in connection with supplying a complaint book as described in the Minerals Act No. 50 of 1991.

1.2.1 Where must the complaint book be kept? (1)

1.2.2 What kinds of complaints are entered into the complaints book? (2)

1.2.3 Who must inspect this book and how often? (2)
[5]

QUESTION 2: MEASURING INSTRUMENTS

2.1 FIGURE 1 indicates a reading as seen on a metric inside micrometer.

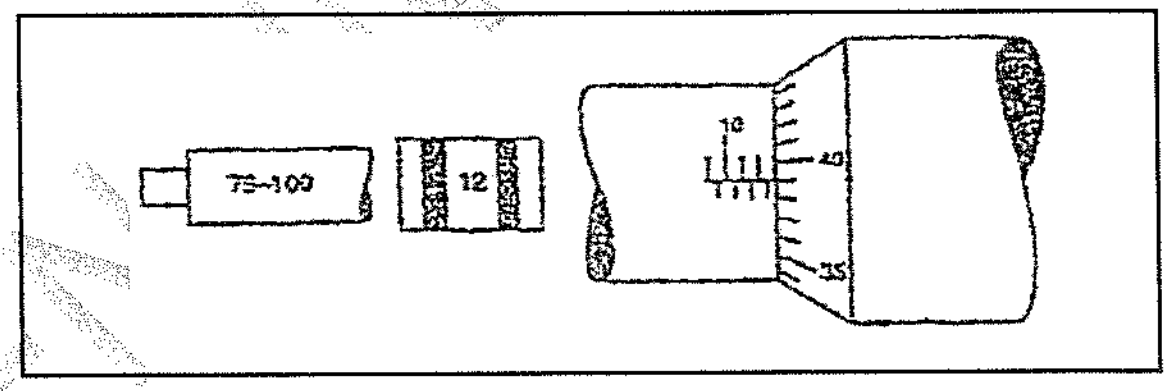

FIGURE 1

2.1.1 Write the correct reading as seen in FIGURE 1.

2.1.2 Name the degree of accuracy of the measuring instrument in FIGURE 1.

2.1.3 How long is the main scale on the inside micrometer?

2.1.4 What is the purpose of the handle supplied with the inside micrometer?

(4 × 1) (4)

2.2 Make a neat enlarged drawing of only the reading of the following measuring instruments:

2.2.1 A metric depth micrometer 18,24 mm (4)

2.2.2 A vernier protractor 26°55' (3)
[11]

QUESTION 3: SCREW TREADS

Make a neat drawing and also indicate the included angle of the following screw thread profiles:

3.1 V-screw thread

3.2 Square screw thread

3.3 Acme screw thread

(3 × 2) **[6]**

QUESTION 4: HAND TOOLS

State the use of each of the following hand tools as used in industry:

4.1 Soft-faced hammer

4.2 Second-cut file

4.3 Flat chisel

4.4 Centre punch

4.5 General purpose pliers

4.6 Chain tongs

(6 × 1) **[6]**

QUESTION 5: METALS AND PLASTIC

5.1 Name TWO types of cast iron and state where they are used. (4)

5.2 Explain the difference between *hardening* and *case hardening*. (2)

5.3 Name the composition, ONE property and ONE use of the following non-ferrous alloys:

5.3.1 Brass

5.3.2 Bronze

(2 × 3) (6)
[12]

QUESTION 6: MARKING OFF

Write only the name of the correct marking-off tools (FIGURE 2) next to the letters (A–E) in the ANSWER BOOK.

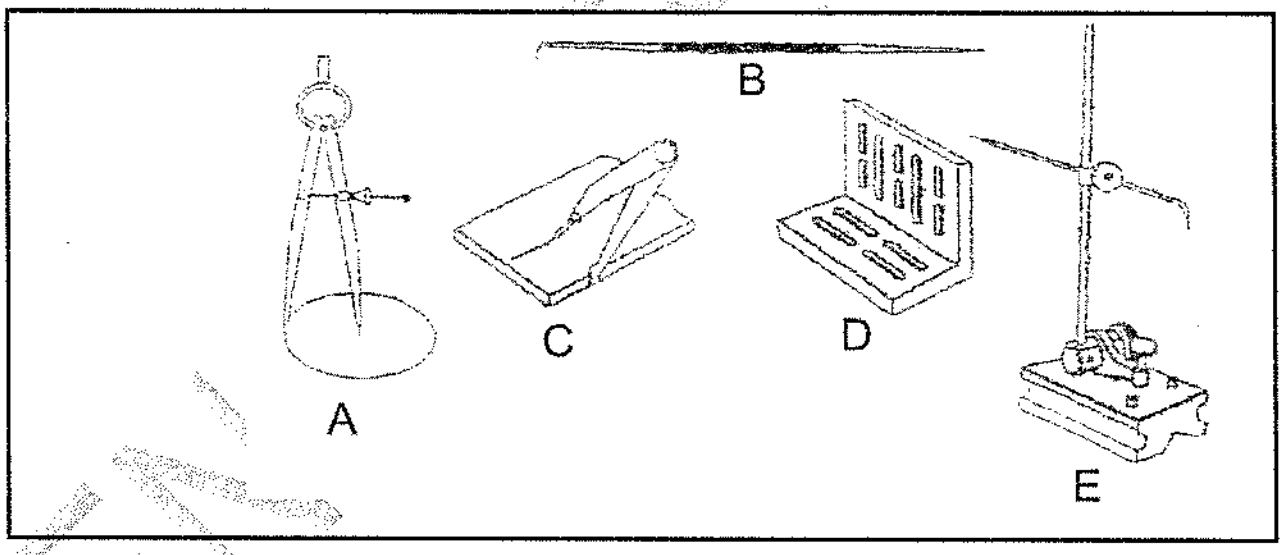

FIGURE 2 **[5]**

QUESTION 7: KEYS AND KEYWAYS

7.1 State TWO different machining processes applied to obtain keyways on shafts and in holes. (2)

7.2 State ONE use of a feather key. (1)

7.3 Calculate the height, width and the length of a key to be fitted to a shaft with a diameter of 45 mm. (3)
[6]

QUESTION 8: FASTENERS

Explain the use of each of the following fastening devices in industry:

8.1 Locking wire

8.2 Alien screws

8.3 Drive screws

8.4 Cir-clips

(4 × 1) **[4]**

QUESTION 9: HAND TAPS, DIES AND REAMERS

9.1 State TWO thread-cutting faults with taps and explain how you would rectify these faults. (4)

9.2 How can one distinguish between a left-hand tap and a right-hand tap? (1)

[5]

TOTAL SECTION A: 60

SECTION B (MACHINE CUTTING TOOLS AND MACHINES)

Answer any FOUR questions from this section.

QUESTION 10: DRILLING MACHINES

10.1 State THREE reasons for using cutting fluids on a drilling machine when drilling holes. (3)

10.2 The cutting speed for mild steel is 30 meters per minute and the spindle speed was 800 rpm.

Calculate the diameter of the drill that was being used to drill the hole. (3)

10.3 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (10.3.1–10.3.4) in the ANSWER BOOK.

10.3.1 The process that makes provision for a 60 degree screw head to be flushed with the surface of a work piece is known as counter boring.

10.3.2 The feed of the drill on a sensitive drilling machine is transferred by means of a plain lever on which a pinion is fitted and meshed in with a rack.

10.3.3 To remove a straight shank drill from a drilling machine spindle a taper drill drift is used.

10.3.4 Drill bits up to 50 mm in diameter may be used on a column drilling machine.

(4 × 1) (4)
[10]

QUESTION 11: GRINDING MACHINES AND MACHINE CUTTING TOOLS

11.1 Explain what is meant by positive rake and negative rake when working with cutting tools. (2)

11.2 Describe the term *chip breaking* as applicable to machine cutting tools. (2)

11.3 Write only the name of the components (FIGURE 3) next to the letters (A–F) in the ANSWER BOOK.

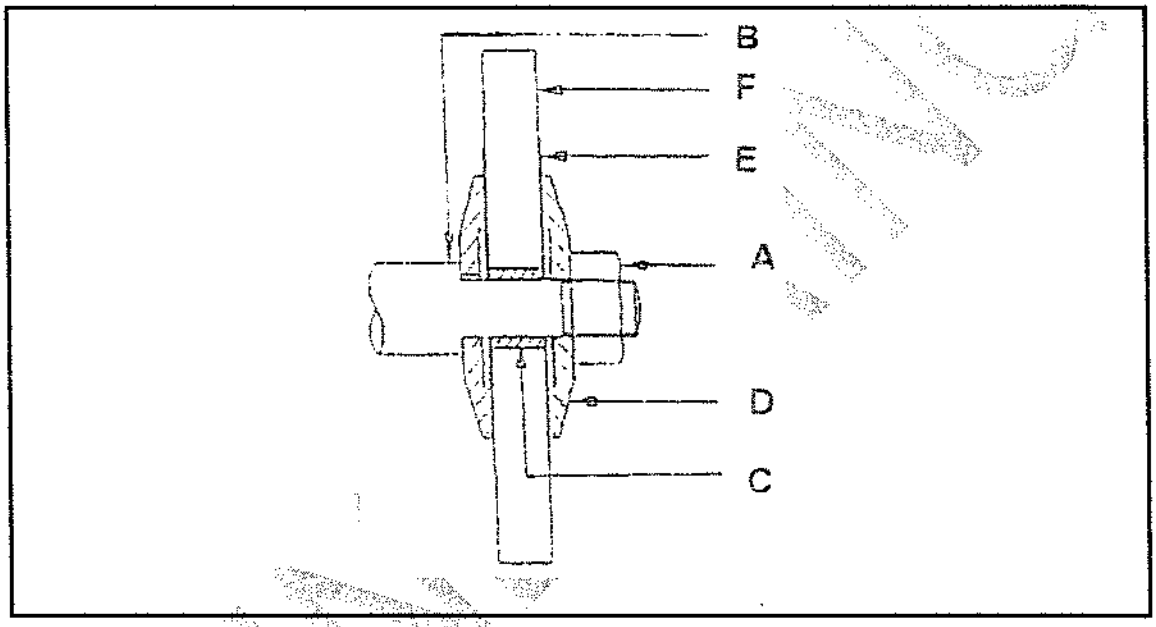

FIGURE 3 (6)

[10]

QUESTION 12: GENERAL

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (12.1–12.10) in the ANSWER BOOK.

12.1 The shaping machine can easily be replaced by a milling machine.

12.2 The days of the conventional lathe is over, it will be totally replaced by the CNC lathe.

12.3 We use a screw thread pitch gauge to set up a screw cutting tool, 90° to the work piece.

12.4 Internal-diameter cutting on a lathe is done with a boring bar.

12.5 A fixed steady is bolted against the tail-stock.

12.6 A 3–jaw-chuck's running speed is faster than a 4–jaw-chuck.

12.7 If you are strong enough, you can hold a thin piece of plate by hand for drilling work.

12.8 A Huntington dresser is being used to cut the front surface of the grinding wheel straight again.

12.9 If the gap between grinding wheel and work rest is more than 3 mm, it means that the grinding wheel is worn out.

12.10 The speed with a hacksaw is ±120 strokes per minute.

(10 × 1) **[10]**

QUESTION 13: CENTRE LATHE

13.1 The centre lathe can be used to perform various types of operations.

Name THREE of these operations. (3)

13.2 Name THREE advantages of using an independent four-jaw chuck on the centre lathe. (3)

13.3 Give TWO reasons why preference is sometimes given to a rotating/running centre instead of a fixed centre. (2)

13.4 State TWO disadvantages of the CNC lathe when compared with the conventional lathe. (2)

[10]

QUESTION 14: MILLING MACHINE

14.1 Write only the names of the components of the milling machine (FIGURE 4) next to the letters (A–E) in the ANSWER BOOK.

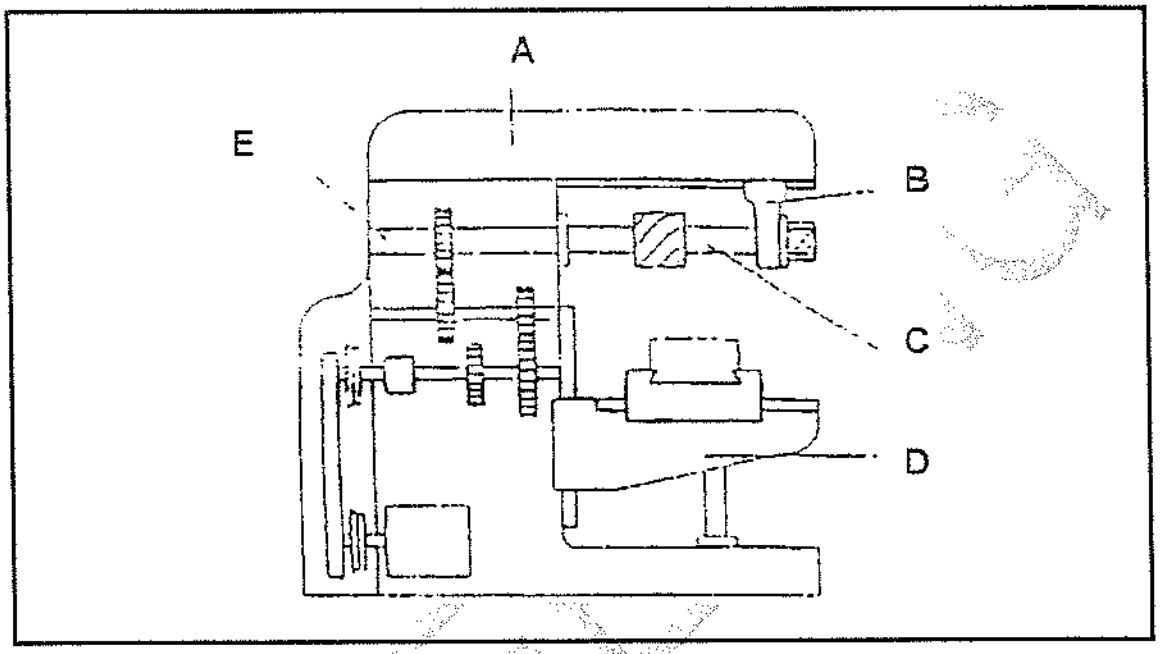

FIGURE 4 (5)

14.2 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (14.2.1–14.2.5) in the ANSWER BOOK.

14.2.1 Table strips are used to stop the automatic feed at pre-set positions.

14.2.2 An air hose can be used to remove the chips from the machine.

14.2.3 Plain and universal milling machines are also known as knee-type machines.

14.2.4 Gear cutting can be done in a dividing head on a milling machine.

14.2.5 The adjustable tail stock is used to adjust the table upward or downwards.

(5 × 1) (5)
[10]

TOTAL SECTION B: 40
GRAND TOTAL: 100

FORMULA SHEET

Any applicable formula may also be used.

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

2. $w = feed/stroke \times strokes/min \times t$

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

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

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