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higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T690**(E)**(A6)T

NATIONAL CERTIFICATE

FITTING AND MACHINING THEORY N1

(11021871)

6 April 2018 (X-Paper)
09:00–12:00

Calculators and drawing instruments may be used.

This question paper consists of 9 pages and 1 formula sheet.

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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 will be marked. ALL work you do not want to be marked must be clearly crossed out.

INSTRUCTIONS AND INFORMATION

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

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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 Explain FIVE safety precautions to follow when working with hand tools. **[5]**

OR

1.2 Regulation 4.7.1 deals with persons in a state of intoxication.

Briefly answer the following:

1.2.1 What is a person incapable of doing when in a state of intoxication? (2)

1.2.2 Where should an intoxicated person NOT be allowed to enter? (2)

1.2.3 What course of action can a manager take against a person who is intoxicated inside the workings of a mine? (1)

[5]

QUESTION 2: MEASURING INSTRUMENTS

2.1 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (2.1.1–2.1.3) in the ANSWER BOOK.

2.1.1 An outside micrometer is used for measuring deep, small holes.

2.1.2 Extension rods can be used on an inside micrometer.

2.1.3 A depth micrometer is used for measuring the distance between stepped faces.

(3 × 1) (3)

2.2 Make a neat drawing of an outside micrometer with the following reading:

9,98 mm (4)

2.3 Give TWO uses of a dial test indicator. (2)

2.4 How would one use a thread-pitch gauge? (2)

[11]

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QUESTION 3: SCREW THREADS

3.1 Differentiate between an *external thread* and an *internal thread*. (1 + 1) (2)

3.2 Give TWO applications of a coarse-pitch thread. (2)

3.3 Calculate the depth of a M30 screw thread with a pitch of 2 mm. (2)
[6]

QUESTION 4: HAND TOOLS

4.1 List THREE uses of hammers. (3)

4.2 The term *grade* is used to describe the degree of coarseness of a file.

Name THREE grades of files. (3)
[6]

QUESTION 5: METALS AND PLASTICS

5.1 Besides carbon, there are small amounts of other elements in iron.

Name THREE other elements that can be found in iron. (3)

5.2 Low-range high-carbon steel is tough and hard.

Name THREE uses of high-carbon steel. (3)

5.3 Tempering reduces brittleness and increases toughness.

Briefly describe the tempering process. (2)

5.4 Nonferrous metals contain no iron.

Name FOUR commonly used nonferrous metals. (4)
[12]

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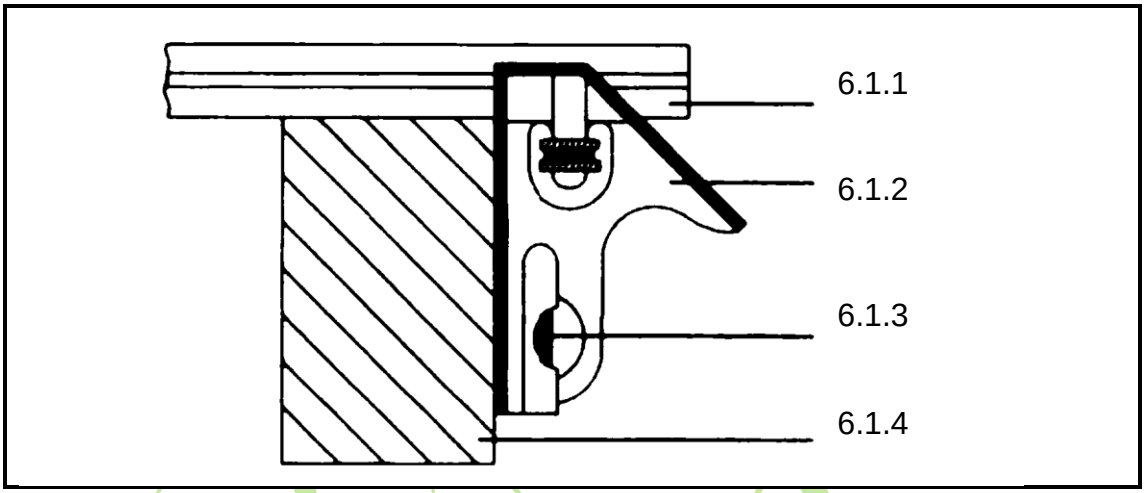
QUESTION 6: MARKING OFF

6.1 The figure below shows a combination set. Label the component parts by writing the name next to the question number (6.1.1–6.1.4) in the ANSWER BOOK.



(4 × 1) (4)

6.2 Give ONE use of a centre punch. (1)
[5]

QUESTION 7: KEYS AND KEYWAYS

7.1 Name TWO places where one would use a rectangular key. (2)

7.2 Calculate the thickness and width of a key that has to be fitted to a shaft with a diameter of 80 mm. (4)
[6]

QUESTION 8: FASTENERS

8.1 Parts are joined together by fasteners. Threaded fasteners are fasteners which have a thread cut into the shaft.

Name THREE types of commonly used threaded fasteners. (3)

8.2 Give ONE use of a spring washer. (1)
[4]

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QUESTION 9: HAND TAPS, STOCKS, DIES AND REAMERS

9.1 Taps are used to cut internal threads in holes of objects. Sometimes taps break off inside the hole being tapped.

Name TWO tools that can be used to remove a broken tap. (2)

9.2 Name THREE types of reamers. (3)
[5]

TOTAL SECTION A: 60

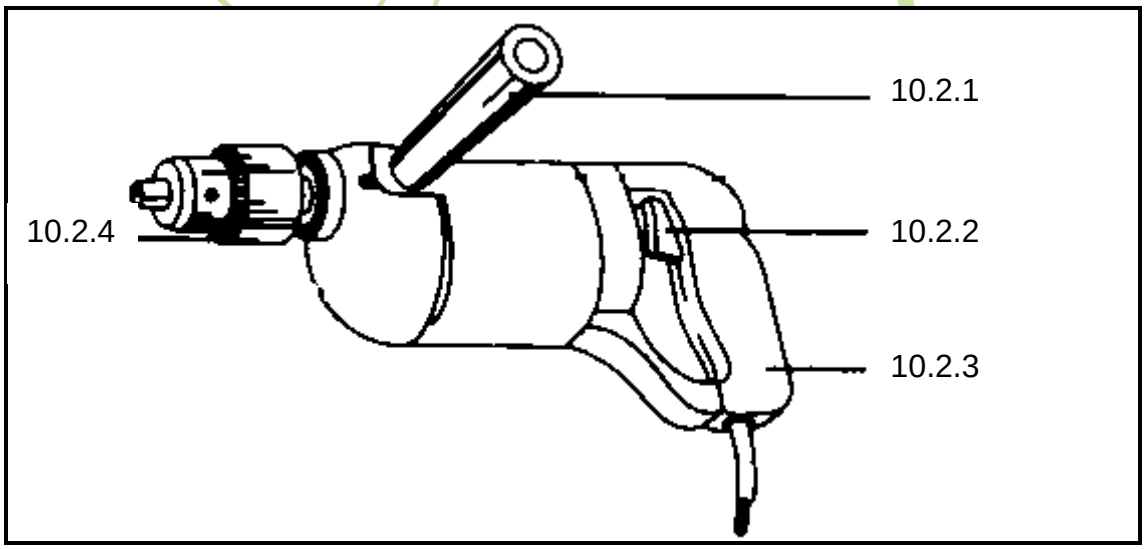
SECTION B

NOTE: Answer ALL FOUR questions from this section.

QUESTION 10: DRILLING MACHINES

10.1 List THREE safety precautions to follow when working with drilling machines. (3)

10.2 The figure below shows a portable hand drilling machine. Label the component parts by writing the answer next to the question number (10.2.1–10.2.4) in the ANSWER BOOK.



(4 × 1) (4)

10.3 A 20 mm diameter hole must be drilled into a workpiece. The cutting speed is 400 mm/s.

Calculate the speed of the drill in revolutions per minute. (3)
[10]

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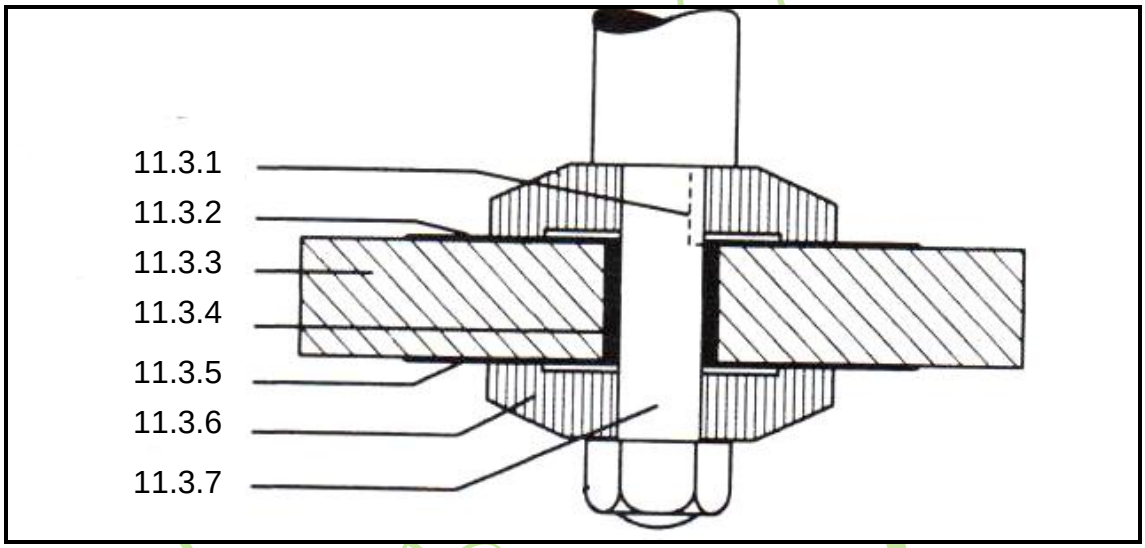
QUESTION 11: GRINDING MACHINES AND MACHINE-CUTTING TOOLS

11.1 Name TWO types of grinding wheel dressers. (2)

11.2 What is the purpose of a ring test on a grinding wheel? (1)

11.3 The figure below shows a mounted grinding wheel. Label the components by writing the answer next to the question number (11.3.1–11.3.7) in the ANSWER BOOK.



(7 × 1) (7)

[10]

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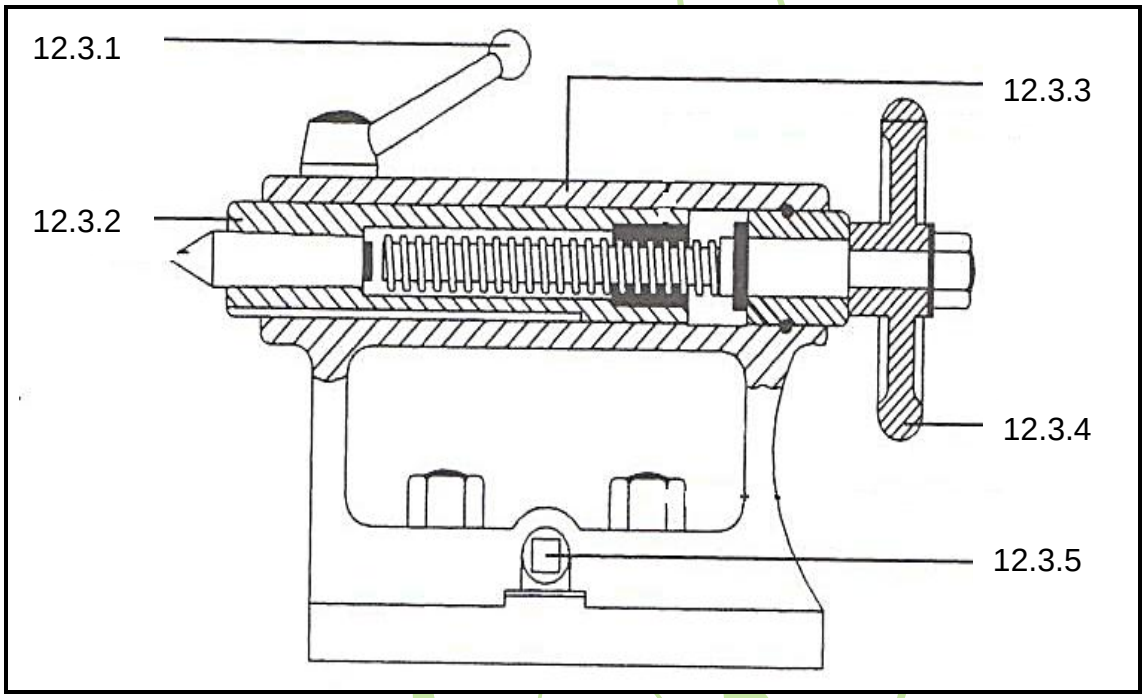
QUESTION 12: CENTRE LATHES

12.1 List THREE operations that can be carried out on a centre lathe. (3)

12.2 Why is it dangerous to stop the lathe by reversing the direction of movement? (It is a lathe where the chunk is screwed on the spindle.) (2)

12.3 The figure below shows a section of a tailstock. Label the parts by writing the answer next to the question number (12.3.1–12.3.5) in the ANSWER BOOK.



(5 × 1) (5)
[10]

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QUESTION 13: MILLING MACHINES

13.1 Milling machines are used in most modern workshops.

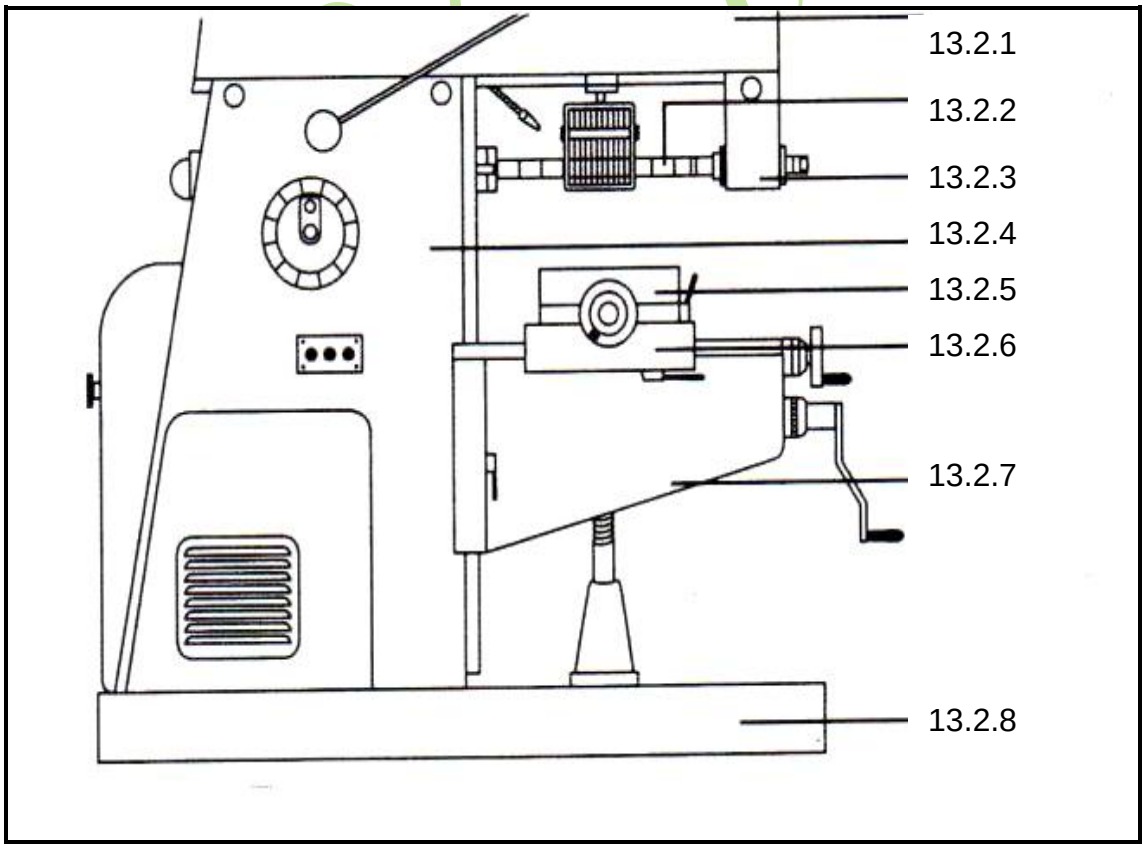
Explain each of the following actions that can be performed on a milling machine:

13.1.1 Slotting or grooving

13.1.2 Helical cutting

(2 × 1) (2)

13.2 The figure below shows a milling machine. Label the parts by writing the answer next to the question number (13.2.1–13.2.8) in the ANSWER BOOK.



(8 × 1) (8)

[10]

TOTAL SECTION B: 40
GRAND TOTAL: 100

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FORMULA SHEET

Any applicable formula may also be used.

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

2. w = feed/stroke × strokes/min × t

3. $\text{Strokes/min} = \dfrac{S}{\text{length of stroke}} \times \text{ratio}$

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

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

6. $d = 0{,}757P$

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