higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T690(**E**)(J31)T

NATIONAL CERTIFICATE

FITTING AND MACHINING THEORY N1

(11021871)

31 July 2018 (X-Paper)
09:00–12:00

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

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SECTION A: GENERAL PRACTICE

Answer either QUESTION 1.1 OR QUESTION 1.2

QUESTION 1: OCCUPATIONAL SAFETY

1.1 State FIVE safety measures that you must follow when using machinery. (5)

OR

1.2 1.2.1 State TWO conditions under which a diesel engine cannot be used underground. (2 × 2) (4)

1.2.2 State the regulation with respect to the carrying of tools on ladderways. (1)

[5]

QUESTION 2: MEASURING INSTRUMENTS

2.1 Explain the steps that you would follow to determine the inside diameter of a machined cylinder by using an inside micrometer. (6)

2.2 Make a neat drawing of an outside micrometer with a reading of 7.74 mm. (3)

2.3 Give TWO applications of a Vernier caliper. (2)

[11]

QUESTION 3: SCREW THREADS

3.1 Define each of the following terms used to describe screw threads:

3.1.1 Nominal diameter (2)

3.1.2 Root diameter (2)

3.2 Name TWO applications of V-threads which are used to lock or clamp components together. (2)

[6]

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QUESTION 4: HAND TOOLS

4.1 Give ONE use for each of the following files:

4.1.1 Square

4.1.2 Round

4.1.3 Triangular

(3 × 1) (3)

4.2 Explain the mushroom effect that occurs each time a hammer strikes the end of a chisel. (2)

4.3 How is the mushroom effect slowed down on chisels? (1)

[6]

QUESTION 5: METALS AND PLASTICS

5.1 There are various tests to distinguish between cast iron and mild steel.

Explain the different ways in which each metal reacts to the following:

5.1.1 Being fractured (2)

5.1.2 Being machined (2)

5.2 What is the effect of the heat treatment process of normalising on plain carbon steel? (2)

5.3 Pack hardening is a deep case hardening process that is done in three stages.

Name the THREE stages of case hardening. (3)

5.4 Alloying elements added to plain carbon steel alter the properties of the steel.

State TWO direct effects that alloying elements have on steel. (2)

5.5 Name the colour used to identify stainless steel. (1)

[12]

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QUESTION 6: MARKING OFF

6.1 Give TWO uses of a surface gauge. (2)

6.2 Name ONE use each of the following support equipment for marking off:

6.2.1 Engineer's square

6.2.2 V-blocks

6.2.3 Angle plates

(3 × 1) (3)
[5]

QUESTION 7: KEYS AND KEYWAYS

7.1 Explain the function of a feather key. (2)

7.2 Calculate the thickness and width of a key that has to be fitted to a shaft with a diameter of 160 mm. (4)
[6]

QUESTION 8: FASTENERS

8.1 Machine screws are threaded to be used in holes which are already tapped.

Name THREE types of machine screws. (3)

8.2 What is a castle nut? (1)
[4]

QUESTION 9: HAND TAPS, STOCKS, DIES AND REAMERS

9.1 List THREE ways to prevent thread cutting faults when tapping holes in a workpiece (3)

9.2 Name TWO types of dies used to cut an external thread. (2)
[5]

TOTAL SECTION A: 60

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SECTION B

QUESTION 10: DRILLING MACHINES

10.1 Explain each of the following drilling processes:

10.1.1 Countersinking (2)

10.1.2 Counterboring (2)

10.2 List THREE reasons why twist drills sometimes may produce holes of the wrong size or of poor finish. (3)

10.3 Give THREE reasons why drills break during drilling. (3)
[10]

QUESTION 11: GRINDING MACHINES AND MACHINE CUTTING TOOLS

11.1 List FIVE factors to consider when choosing a grinding wheel for a specific task. (5)

11.2 Explain TWO purposes of compressible washers or blotters that are used on both sides of a grinding wheel. (2)

11.3 Name THREE properties of an effective cutting tool. (3)
[10]

QUESTION 12: CENTRE LATHE

12.1 The centre lathe is found in most modern workshops.

Why must you check the workpiece frequently when you are machining between centres? (2)

12.2 Give TWO uses of the tailstock on a lathe. (2)

12.3 The purposes of chucks are to locate and hold a workpiece in position.

Explain the difference between a three-jaw chuck and a four-jaw chuck. (2)

12.4 List FOUR advantages of using a taper-turning attachment to cut tapers. (4)
[10]

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QUESTION 13: MILLING MACHINE

13.1 List SIX basic safety measures an operator should follow when using a milling machine. (6)

13.2 Describe the function of each of the following milling-machine parts:

13.2.1 Universal head

13.2.2 Table trips

13.2.3 Bracing arms

13.2.4 Adjustable footstock

(4 × 1) (4)
[10]

TOTAL SECTION B: 40
GRAND TOTAL: 100

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FITTING AND MACHINING THEORY N1

FORMULA SHEET

Any applicable formula may also be used.

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

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

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

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

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

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

6. $depth\ (d) = 0{,}613 \times P$

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