higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1050**(E)**(A9)T

NATIONAL CERTIFICATE

MECHANICAL AND DRAWING-OFFICE ORIENTATION N4

(8090184)

9 April 2018 (X-Paper)
9:00–12:00

CLOSED-BOOK EXAMINATION

This question paper consists of 6 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
MECHANICAL AND DRAWING-OFFICE ORIENTATION N4
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. ALL the drawings must be of reasonable size, in good proportion, and be made in pencil.
5. Write neatly and legibly.

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QUESTION 1: INTRODUCTION

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (1.1–1.12) in the ANSWER BOOK.

1.1 There is no difference between *hydrodynamic* lubrication and *hydrostatic* lubrication.

1.2 The word scanning means 'to gather information'.

1.3 Fluorescent lights should be fitted when using CAD.

1.4 An UPS system helps to ensure clean power for computers.

1.5 No extra room needs to be available to do printing.

1.6 Any person can do maintenance on office equipment.

1.7 No 'block numbering' is required with CAD drawings.

1.8 The length of a shaft key is calculated by multiplying the diameter of the shaft by 1,5.

1.9 Welding is NOT a joining process.

1.10 Plastic is NOT a synthetic substance.

1.11 Manganese steel is used for rock-crushing plants and railway crossovers.

1.12 An expansion diaphragm is used on low-pressure apparatus only.

(12 × 1) **[12]**

QUESTION 2: DRAWING-OFFICE LAYOUT AND EQUIPMENT

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 (2.1.1–2.1.6) in the ANSWER BOOK.

2.1.1 Drawings should NOT be filed consecutively.

2.1.2 Use bright light in a CAD drawing room.

2.1.3 A draughtsman should have good problem-solving abilities.

2.1.4 Copying machines operate at a lower cost than duplicating machines.

2.1.5 A catalogue is an important document for a drawing office.

2.1.6 Air-conditioning can be used for ventilation.

(6 × 1) (6)

2.2 State any FOUR aspects regarding lighting that need to be considered before planning the layout of a drawing office. (4)

[10]

QUESTION 3: ENGINEERING MATERIALS AND HEAT TREATMENT

3.1 Give FIVE main characteristics/advantages of aluminium. (5)

3.2 What is the basic difference between *steel* and *cast iron*? (2)

3.3 Plastics are compounds of carbon with one other element.

Give the names of FIVE compound elements. (5)

3.4 Explain the *tempering process* using steel. (3)

[15]

QUESTION FOUR: MACHINING AND MANUFACTURING PROCESSES

4.1 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (4.1.1–4.1.5) in the ANSWER BOOK.

4.1.1 Boring can be used to correct misalignment errors of previously drilled holes.

4.1.2 A mandrel is used on a milling machine.

4.1.3 Aluminium oxide and silicon carbide are abrasive materials.

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4.1.4 Cutting speed is expressed in metres per second.

4.1.5 Vegetable oils are used for heavy-duty turning.

(5 × 1) (5)

4.2 Name THREE factors on which the method of holding a work piece depends. (3)

4.3 Explain what you understand by the *datum line*/*point* as indicated on a manufacturing drawing. (1)

4.4 Explain the term *allowance.* (1)
[10]

QUESTION 5: MEASURING INSTRUMENTS

5.1 Draw the diagram of an outside micrometer which shows a reading of 6,80 mm, and show ALL the steps of how to obtain 6,80 mm. (6)

5.2 Give FOUR uses of a vernier calliper. (4)
[10]

QUESTION 6: KEYS, PULLEYS, CLUTCHES, COUPLINGS AND SCREW THREADS

6.1 Name THREE groups of couplings. (3)

6.2 Make a simple, freehand drawing of a square claw-coupling, and name TWO different components of the coupling. (4)

6.3 Give the other well-known name for the Hook's coupling. (1)

6.4 If the diameter of a shaft is 120 mm, what will the key width be? (1)
[9]

QUESTION 7: BEARINGS AND LUBRICATION

7.1 Draw a well-labelled diagram of the sectional view of a sight-feed lubricator. (7)

7.2 Name THREE types of loads that can act on bearings. (3)
[10]

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QUESTION 8: GEAR DRIVES

8.1 If the module (m) of a gear system is equal to 6, calculate the dedendum of the gear system. (2)

8.2 Explain, in your own words, each of the following in relation to *spur gears*:

8.2.1 Addendum

8.2.2 Dedendum

8.2.3 Circular thickness

8.2.4 Chordal thickness

8.2.5 Backlash

(5 × 1) (5)

8.3 Name the gear system that converts rotary motion into straight-line motion. (1)

8.4 Calculate the number of teeth of a gear with a pitch-circle diameter (PCD) of 100 mm and a module of 10. (2)

[10]

QUESTION 9: VALVES, PUMPS AND PIPE FITTINGS

9.1 Make a free-hand drawing of a sliding expansion joint and add ALL labels. (7)

9.2 Give any THREE common faults experienced by sliding expansion joints. (3)

9.3 Explain the working principle of a rotary control valve, and give ONE example. (4)

[14]

TOTAL: 100

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