higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

MECHANICAL AND DRAWING-OFFICE ORIENTATION N4

(8090184)

20 April 2021 (X-paper)
09:00–12:00

This question paper consists of 5 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. Write neatly and legibly.

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QUESTION 1: INTRODUCTION

1.1 Name FOUR levels of graphic communication. (4)

1.2 State the personal attributes required for a draughtsman. (5)

1.3 Who formulated the first distinct definition of orthographical projection? (1)

1.4 Explain microfilming. (2)

[12]

QUESTION 2: DRAWING-OFFICE LAYOUT AND EQUIPMENT

Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (2.1.1.–2.1.6) in the ANSWER BOOK.

2.1 2.1.1 Blueprinting is the oldest method and the only low-cost process available for copying drawings since 1842.

2.1.2 Symbols are used as a representation of words.

2.1.3 Assembly drawings show the production of a product.

2.1.4 A technician does not need a skill to interpret engineering drawings.

2.1.5 All objects have only two dimensions.

2.1.6 A drawing is a master document and is often the only copy.

(6 × 1) (6)

2.2 Name FOUR aspects to consider when planning the layout of a drawing office. (4)

[10]

QUESTION 3: ENGINEERING MATERIALS AND HEAT TREATMENT AND EQUIPMENT

3.1 Use a table format and name THREE properties and THREE uses of chrome in industry. (6)

3.2 Name TWO nonferrous composition elements used to make brass. (4)

3.3 Briefly explain nonferrous metal. (1)

3.4 Give TWO types of commonly known thermosetting plastics and state the characteristics of each. (4)

[15]

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QUESTION 4: MACHINING

4.1 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (4.1.1–4.1.5) in the ANSWER BOOK.

4.1.1 Countersunk holes allow the heads of screws to fit flat with surfaces when assembling parts of machinery.

4.1.2 A lead is the distance a thread will advance, axially, in one complete revolution.

4.1.3 Pitch is the distance from a point on a thread to a corresponding point on an adjacent thread.

4.1.4 A plain split bearing is used when it is impossible to use a solid bearing.

4.1.5 Footstep bearings support shafts that rotate in a horizontal position.

(5 × 1) (5)

4.2 Explain the drilling process with the aid of a clearly labelled diagram. (5)
[10]

QUESTION 5: MEASURING INSTRUMENTS

5.1 Explain the difference between bilateral tolerance and unilateral tolerance. (2)

5.2 Name FOUR important factors to remember when choosing a steel ruler. (4)

5.3 Briefly describe the stages of measuring using an inside micrometre. (4)
[10]

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

Draw a Raffard coupling and label any SIX components. **[9]**

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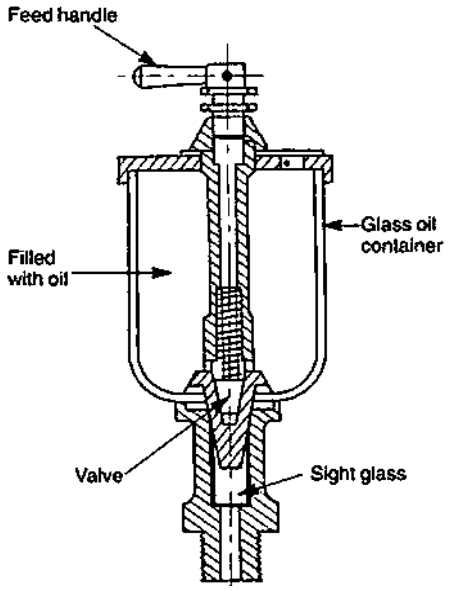
QUESTION 7: BEARINGS AND LUBRICATION

7.1 Explain the principle of operation of the sight-feed lubricator below.



SIGHT-FEED LUBRICATOR (6)

7.2 Explain the impact of cold and hot temperatures on lubricants. (4)
[10]

QUESTION 8: GEAR DRIVES

8.1 Explain the care and maintenance of gear drives. (6)

8.2 Explain, with the aid of a diagram, the operation of an internal gear system. (3)

8.3 Calculate the number of teeth for a gear with an addendum of 6 mm and a pitch-circle diameter of 0,3 m. (1)
[10]

QUESTION 9: VALVES, PUMPS AND PIPE FITTINGS

9.1 State FOUR faults experienced with sliding expansion joints. (4)

9.2 State FOUR advantages of centrifugal pumps over reciprocating pumps. (4)

9.3 Give SIX causes of slip on a pump. (6)
[14]

TOTAL: 100

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