higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1050**(E)**(A8)T

NATIONAL CERTIFICATE

MECHANICAL AND DRAWING-OFFICE ORIENTATION

(8090184)

8 August 2019 (X-Paper)
09:00–12:00

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
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. Sketches must be large, neat and fully labelled.
5. Write neatly and legibly.

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QUESTION 1: INTRODUCTION

1.1 What are the main functions of a typical drawing office? (4)

1.2 Make a neat sectional drawing of a transition fit of a shaft into a hole.

Indicate the following on the drawing:

- Minimum interference
- Maximum clearance
- Minimum clearance
- Shaft
- Hole (8)

[12]

QUESTION 2: DRAWING-OFFICE LAYOUT AND EQUIPMENT

2.1 State any FIVE pieces of information that should be on a drawing register. (5)

2.2 List FIVE important aspects that should be recorded when a drawing is issued. (5)

[10]

QUESTION 3: ENGINEERING MATERIALS AND HEAT TREATMENT

3.1 Name FIVE heat-treatment processes used to change the properties of plain carbon steel. (5)

3.2 Give THREE properties and THREE uses of tin in the industry. (3 + 3) (6)

3.3 Explain the term *gas carburising* (*nitriding*). (4)

[15]

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QUESTION 4: MACHINING

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 Casting is a manufacturing process.

4.1.2 Clearance is the difference between the size of the hole and the size of the shaft.

4.1.3 Drop forging is not a manufacturing process for more complicated forgings.

4.1.4 Planing is a machining process where the bed moves forwards and backwards under a stationary cutting tool.

4.1.5 Threading can be done on a lathe.

(5 × 1) (5)

4.2 Briefly explain *chamfering.* (2)

4.3 Explain *milling operation*. (3)

[10]

QUESTION 5: MEASURING INSTRUMENTS

5.1 Draw a neat diagram of vernier callipers and label any FOUR parts. (8)

5.2 Name TWO main components of a micrometer. (2)

[10]

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

6.1 What is a *jaw coupling*? (2)

6.2 Draw a simple freehand drawing of a muff coupling and name TWO different components of the coupling. (5)

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

6.4 If the width of a key is 0,02 m what will the shaft diameter be in m? (1)

[9]

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QUESTION 7: BEARINGS AND LUBRICATION

7.1 Explain the operation of a siphon-wick lubricator by means of a diagram. (5)

7.2 State FOUR important aspects to consider before deciding on the necessary lubricant for a job. (4)

7.3 Define the term *flash point*. (1)
[10]

QUESTION 8: GEAR DRIVES

8.1 Define the term *epicyclical gear train.* (2)

8.2 Explain each of the following terms related to spur gears:

8.2.1 Chordal thickness

8.2.2 Pressure angle

8.2.3 Base circle

8.2.4 Clearance

8.2.5 Backlash

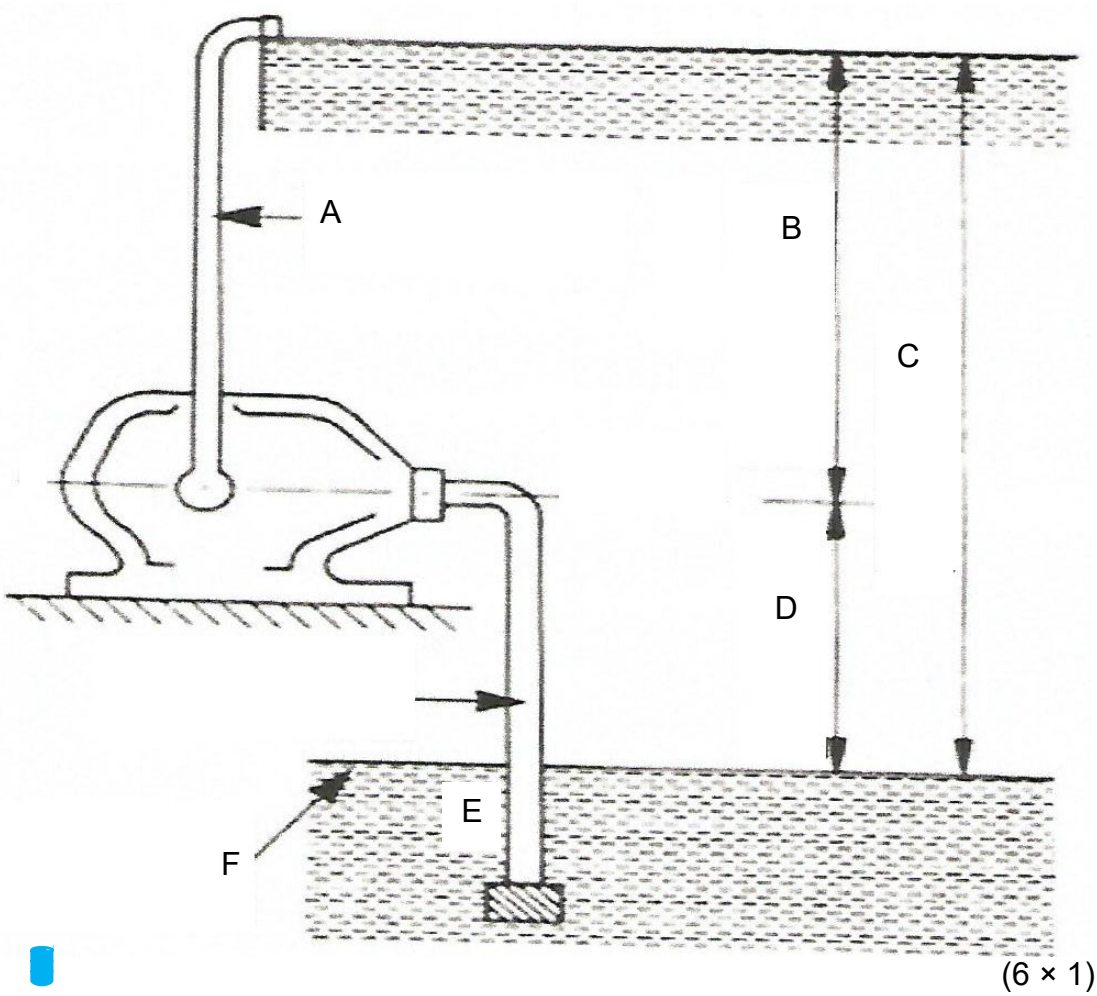
(5 × 1) (5)

8.3 Give THREE gear combinations that can be obtained by the planetary system of gears. (3)
[10]

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QUESTION 9: VALVES, PUMPS AND PIPE FITTINGS

9.1 Label the diagram below by writing only the answer next to the letter (A–F) in the ANSWER BOOK.



(6 × 1) (6)

9.2 Make a labelled freehand sketch of a gear pump. (4)

9.3 Explain the working principles of a relief valve. (4)
[14]

TOTAL: 100

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