higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1050**(E)**(A2)T

NATIONAL CERTIFICATE

MECHANICAL AND DRAWING-OFFICE ORIENTATION

(8090184)

2 August 2018 (X-Paper)
09:00–12:00

CLOSED-BOOK EXAMINATION

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
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 drawings must be of reasonable size, in good proportion and in pencil.
5. Write neatly and legibly.

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QUESTION 1: INTRODUCTION

1.1 List the FOUR levels of graphic communication in the correct order. (4)

1.2 Make a neat sectional drawing of the transition fit of a shaft into a hole. (3)

Indicate the following on the drawing:

- Minimum interference (1)
- Maximum clearance (1)
- Minimum clearance (1)
- Shaft and hole (2)

[12]

QUESTION 2: DRAWING-OFFICE LAYOUT AND EQUIPMENT

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

2.2 State 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 main properties of aluminium. (5)

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

3.3 Give TWO properties of steel after going through a tempering process. (2)

3.4 Name TWO nonferrous composition elements used to make brass. (2)

[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 A plain split bearing is used where it is impossible to use a solid bearing.

4.1.2 Footstep bearings support shafts that rotate in the vertical position.

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

4.1.5 Positive rake occurs when the wedge angle is more than 90 degrees.

(5 × 1) (5)

4.2 What does ISO stand for? (1)

4.3 Name FOUR surfaces that a shaping machine can produce. (4)
[10]

QUESTION 5: MEASURING INSTRUMENTS

Draw a complete outside micrometer and indicate ALL detail. **[10]**

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

6.1 Give the disadvantage of a plate clutch. (1)

6.2 Briefly explain with the aid of a basic, fully labelled freehand drawing the working principle of a centrifugal clutch. (8)
[9]

QUESTION 7: BEARINGS AND LUBRICATION

7.1 Use a neat sectional drawing to show the correct way to feed oil to thrust bearings. NO labelling is required. (5)

7.2 Give THREE reasons for noise and vibration on a bearing. (3)

7.3 Briefly explain a full-pressure lubricating system. (2)
[10]

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QUESTION 8: GEAR DRIVES

8.1 Calculate the pitch (p) of a gear system if the module (m) of a gear is 10. (2)

8.2 State FOUR important aspects to regularly inspect in gear drives. (4)

8.3 Use TWO freehand drawings to show the differences between a *single spur gear* and a *single helical gear*. (2 + 2) (4)

[10]

QUESTION 9: VALVES, PUMPS AND PIPE FITTINGS

9.1 Make a fully labelled freehand drawing of an expansion diaphragm. (4)

9.2 Briefly explain the operational principle of a gear pump. (5)

9.3 Give FIVE advantages of centrifugal pumps over reciprocating pumps. (5)

[14]

TOTAL: 100

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