higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

MECHANICAL DRAUGHTING AND TECHNOLOGY

(First paper)

NQF LEVEL 4

(12050694)

15 November 2024 (X-paper)
09:00–12:00

REQUIREMENTS: **A4 drawing sheets**
Yellow cover folder (BOE 8/15)

Nonprogrammable scientific calculators may be used.

This question paper consists of 4 pages.

231Q1N2415

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MECHANICAL DRAUGHTING AND TECHNOLOGY
NQF LEVEL 4
(First paper)
TIME: 3 HOURS
MARKS: 75

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. Use only a black or blue pen.
5. Write neatly and legibly.

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QUESTION 1: PRINCIPLES OF DESIGN

1.1 To build a prototype is crucial for any design.

Name TWO design defects that can occur in a prototype design. (2)

1.2 There are certain steps to follow in the engineering design process.

List the EIGHT main steps. (8)
[10]

QUESTION 2: SCREW THREADS AND SPRINGS

2.1 Two turns of a right-handed square thread has a nominal diameter of 136 mm and a pitch of 56 mm.

Calculate:

2.1.1 The length of the square thread

2.1.2 The pitch divisions

(2 × 4) (8)

2.2 A wave spring can be seen as a type of compression spring.

Name THREE other types of compression springs used in the engineering industry. (3)

2.3 A helical spring made of 28 mm square material has an outside diameter of 182 mm and a lead of 76 mm.

Calculate the length of the spring for TWO full left-hand turns (coils). (4)
[15]

QUESTION 3: GEARS AND KEYS

3.1 Mitre gears are an example of gears often used in the engineering industry.

Mention FOUR other types of gears used in the engineering industry. (4)

3.2 Give EIGHT applications of involute gears. (8)

3.3 Apart from a feather key, name THREE other types of keys used in the engineering industry. (3)
[15]

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QUESTION 4: CAMS

4.1 Give THREE applications of cams in the engineering industry. (3)

4.2 Define the term *constant velocity* as it relates to cams. (6)

4.3 The cam is normally a flat piece of metal with a specific shape that is attached to a shaft that allows it to be turned.

List THREE types of cams used in the engineering industry. (3)

4.4 The follower's movement depends completely on the profile of the cam it follows.

Name THREE types of motion produced by cams. (3)
[15]

QUESTION 5: ASSEMBLY AND DETAIL DRAWINGS

5.1 Dimensions are usually part off a detail drawing.

Name FOUR reasons for writing dimensions on a detail drawing. (4)

5.2 Explain FOUR reasons why assembly drawings are important. (8)

5.3 Name TWO types of sections commonly found on detail drawings. (2)

5.4 Explain the difference between the THREE principal views used in first-angle and third-angle orthographic projection by means of placement sketches. (4)

5.5 Give TWO purposes of including a title, scale and projection symbol on an assembly drawing. (2)
[20]

TOTAL: 75

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