higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

MECHANOTECHNOLOGY N3

(8190373)

28 November 2023 (X-paper)
09:00–12:00

Nonprogrammable calculators may be used.

This question paper consists of 5 pages and 1 formula sheet.

138Q1E2328

Copyright reserved

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
MECHANOTECHNOLOGY N3
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. Start each question on a new page.
5. Use only a black or a blue pen.
6. Write neatly and legibly.

Copyright reserved

QUESTION 1: POWER TRANSMISSION

1.1 Give FIVE factors to be considered when using chain drives. (5)

1.2 Name THREE misalignments that can be accommodated by a flexible-tyre coupling. (3)

1.3 Name FOUR disadvantages of a multi-disc clutch plate. (4)

1.4 Explain the use of a clutch. (2)

1.5 Briefly state FOUR factors to consider before deciding to apply gear drives. (4)

1.6 State TWO causes of slippage in cone clutches. (2)
[20]

QUESTION 2: BRAKES

2.1 Name FOUR advantages of air brakes. (4)

2.2 State whether the following statement is TRUE or FALSE by writing only 'True' or 'False' next to the question number (2.2) in the ANSWER BOOK.

One of the advantages of an electromagnetic braking system is that in case of a power failure, the system will be ineffective. (1)
[5]

QUESTION 3: BEARINGS

3.1 State FIVE types of friction bearings. (5)

3.2 Name FIVE points of how bearing failure can be prevented. (5)
[10]

QUESTION 4: WATER PUMPS, COOLING AND LUBRICATION

4.1 Name THREE main moving elements of a reciprocating pump. (3)

4.2 Mention FIVE causes of breakdowns in centrifugal pumps. (5)

4.3 Mention THREE disadvantages of a *direct cooling system* compared to an *indirect cooling system*. (3)

4.4 Mention FOUR reasons for lubricating gear boxes. (4)
[15]

Copyright reserved

QUESTION 5: HYDRAULICS AND PNEUMATICS

5.1 Define the term, *pneumatic power.* (2)

5.2 A hydraulic piston has a diameter of 300 mm. The piston applies a force of 160 N to the hydraulic fluid.

Use π = 3,142

Calculate:

5.2.1 The cross sectional area of the piston (in cm^2). Round off your answer to THREE decimal places (2)

5.2.2 The pressure exerted by the piston in kPa. Round off your answer to THREE decimal places (2)

5.3 State TWO functions of an air service unit. (2)
[8]

QUESTION 6: INTERNAL COMBUSTION ENGINES

6.1 State TWO disadvantages of diesel engines. (2)

6.2 Explain the induction stroke as applicable to a four-stroke diesel engine. (4)
[6]

QUESTION 7: CRANES AND LIFTING MACHINES

7.1 Name FOUR disadvantages of static tower cranes. (4)

7.2 State THREE factors that affect the permissible carrying capacity of a steel rope sling. (3)
[7]

QUESTION 8: MATERIAL AND MATERIAL PROCESS

8.1 8.1.1 Explain the term, *thermoplastics* (2)

8.1.2 Name ONE use of thermoplastics. (1)

8.1.3 Define the term, *thermosetting plastics.* (2)

8.1.4 Name ONE use of thermosetting. (1)

Copyright reserved

8.2 State the colour coding of the following.

8.2.1 Low alloy steel (1)

8.2.2 Structural steel (1)

8.2.3 Low carbon steel (1)
[9]

QUESTION 9: INDUSTRIAL ORGANISATION AND PLANNING

Communication takes place in many forms, for example spoken or written forms.

9.1 Mention FIVE aims of communication. (5)

9.2 State THREE tips to improve one's listening skills. (3)

9.3 List the information that appears on a requisition card regarding the ordering of goods in an organisation. (2)
[10]

QUESTION 10: ENTREPRENEURSHIP

10.1 Explain the term, *entrepreneurship.* (4)

10.2 State FOUR common ways in which an entrepreneur can generate business ideas in a daily basis. (6)
[10]

TOTAL: 100

Copyright reserved

MECHANOTECHNOLOGY N3

FORMULA SHEET

Any applicable formula may also be used.

1. Corrected power per belt = (basic power per belt + power increment per belt) × correction factor

2. Force (F) = Pressure (P) × Area (A)

3. Work done (W) = Force (F) × Distance (s)

4. Volume (V) = Area of base (A) × Perpendicular height $(\perp h)$

Copyright reserved