higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

MECHANICAL DRAUGHTING AND TECHNOLOGY
NQF LEVEL 4
(First paper)

21 November 2023

This marking guideline consists of 5 pages.

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QUESTION 1: PRINCIPLES OF DESIGN

1.1
- Research the problem: ✓Clarifying objectives✓
- Investigating:✓ Identify the need or problem.✓
- Establish function: ✓ Make the problem clear and think of ideas to solve the problem.✓
- Setting requirements:✓ Brainstorm requirements and choose best suitable✓
- Designing:✓ Design and develop a design brief with possible solutions.✓
- Making:✓ Make or model the solution.✓
- Evaluating:✓ See if the solution solves the problem by evaluating and testing the product.✓
- Improving: ✓ Redesign as/if needed✓ (Any 4 × 2) (8)

1.2
- Defining the problem
- Exploring and researching
- Identifying constraints
- Designing and analysing
- Evaluating
- Delegating
- Specifying
- Testing (Any 2 × 1) (2)

[10]

QUESTION 2: SCREW THREADS AND SPRINGS

2.1 L = n✓ × p✓ (2)

2.2
- Lead is the distance along the screw's axis if it is turned through one complete revolution.
- Pitch is the distance between two peaks. (2)

2.3
- Completely drawn
- Conventional representation
- Conventional representation in section
- Schematic representation (4)

2.4
- Square thread
- V - screw thread
- Acme screw
- Buttress screw thread (Any 3 × 1) (3)

2.5 Spring length = (lead × number of turns) + material size✓
= (75 mm × 2)✓ + 26 mm✓
= 176 mm✓ (4)

[15]

QUESTION 3: GEARS AND KEYS

3.1 $$P = \frac{\pi \times PCD}{n} \checkmark$$

$$= \frac{\pi \times 180}{18} \checkmark$$

$$= 31{,}4 \text{ mm} \checkmark$$

3.2 $$P_d = \frac{n}{PCD} \checkmark$$

$$= \frac{18}{180} \checkmark$$

$$= 0{,}1 \text{ mm} \checkmark$$

3.3 $$t = \frac{p}{2} = \frac{\pi P_d}{2N} \checkmark = \frac{31.4}{2} \checkmark = 15{,}7 \text{ mm/tooth} \checkmark$$

3.4 $$\text{Addendum} = m = \frac{PCD}{n} \checkmark$$

$$= \frac{180}{18} \checkmark$$

$$= 10 \text{ mm} \checkmark$$

3.5 $$\text{Dedendum} = 1{,}25 \times m \checkmark$$
$$= 1{,}25 \times 10 \checkmark$$
$$= 12{,}5 \text{ mm} \checkmark$$

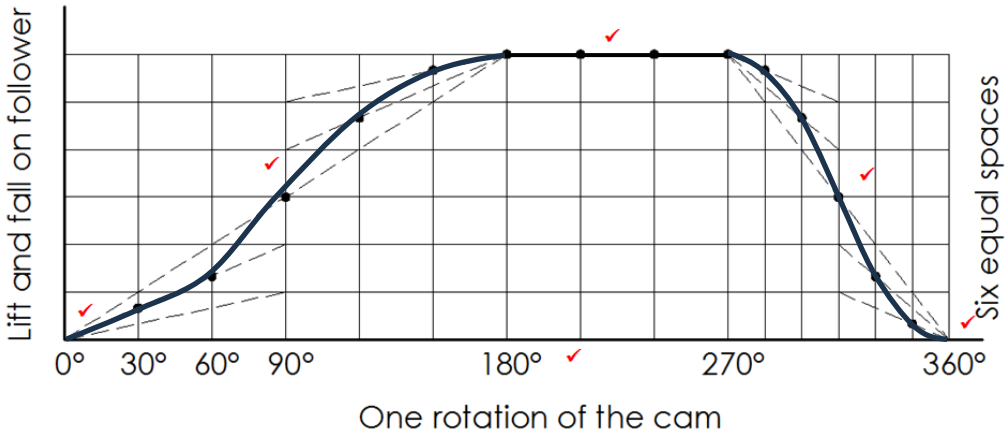
(5 × 3) **[15]**

QUESTION 4: CAMS

4.1 4.1.1 Roller follower
4.1.2 Flat-end follower
4.1.3 Knife-edge follower

(3 × 1) (3)

4.2



(6)

4.3
- Type of motion
- Stroke height
- Performance

(3)

4.4 Performance occurs when the lift, fall and dwell take place. It describes the curve of the diagram (2)

4.5 Dwell-rise-dwell-return (D-R-D-R) cam motion (1)

[15]

QUESTION 5: ASSEMBLY AND DETAIL DRAWING

5.1 Sectioning is the method of drawing that exposes the inside features of an object✓ as though the object had been cut through✓ and the cut-off part had been removed.✓ (3)

5.2
- Dimensions
- Machining symbols
- Surface texture symbols (Any 2 × 1) (2)

5.3 Broken section (1)

5.4
- Dimension lines
- Extension/Projection lines
- Centre lines
- Leader lines (Any 2 × 1) (2)

5.5 To draw✓ at right angle✓ (2)

5.6 To identify✓ the various components✓ on an assembly (2)

5.7 To assist in reading or understanding the different views on a drawing / which system was used to make the drawing. (2)

5.8 A: Top view
B: Rear view
C: Right side view
D: Bottom view
E: Left side view
F: Front view (6 × 1) (6)
[20]

TOTAL: 75

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