higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# MARKING GUIDELINE

## NATIONAL CERTIFICATE (VOCATIONAL)

## MECHANICAL DRAUGHTING AND TECHNOLOGY

(First paper)

**NQF LEVEL 4**

**XX February 2020**

**This marking guideline consists of 5 pages.**

Copyright reserved

**NOTE TO MARKERS:**
This marking guideline serves as a guideline and is not absolute. Consider alternative answers.

## QUESTION 1: PRINCIPLES OF DESIGN

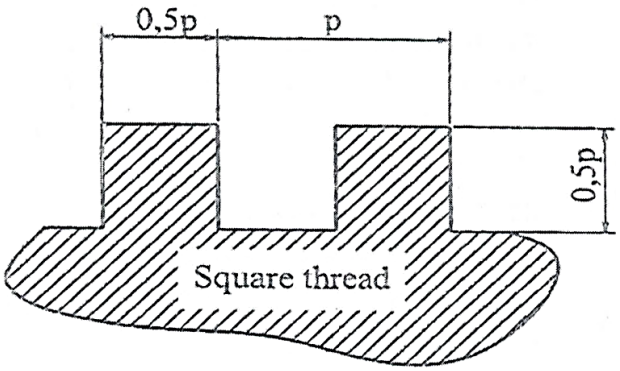
1.1 The engineering design process is a series of steps that engineers follow✓ to come up with a solution for a problem.✓ The solution often involves designing a product (like a machine or computer code)✓ that meets certain criteria and/or accomplishes a certain task.✓ (Any other relevant answer) (4)

1.2
- Line
- Shape
- Form
- Texture
- Space
- Point
- Value
- Colour
- Pattern

(Any 6 × 1) (6)
**[10]**

## QUESTION 2: SCREW THREADS AND SPRINGS

2.1




| | |
|---|---|
| Correctness | 2 |
| Line work | 1 |
| Labelling (pitch) | 1 |

(4)

2.2 A square screw thread is used where high load application is needed. (2)

2.3
- Nut
- Threaded sleeve

(Any ONE) (1)

2.4
- Vice screw
- Jack screw
- Lead screw
- Machine table
- Worm drives

(Any 2 × 1) (2)

2.5 Free length is the length of the spring before it is compressed. (2)

2.6
- Compression spring
- Extension spring
- Torsion spring
- Spring guides

(Any 2 × 1) (2)

2.7 Spring length = (pitch × number of turns) + $\frac{\text{pitch}}{2}$ ✓

= (60 × 2) + ($\frac{60}{2}$) ✓

= 150 mm ✓ (3)

**[16]**

## QUESTION 3: GEARS AND KEYS

3.1 Module = $\frac{\text{PCD}}{\text{Number of teeth}}$ ✓

= $\frac{97,5}{13}$ ✓ **OR** = $\frac{127,5}{17}$

= 7,5 ✓

Module = addendum ✓

Dedendum = 1,25 × addendum ✓

= 1,25 × 7,5 ✓

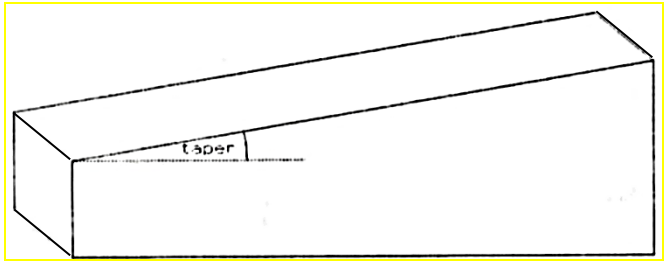
= 9,375 ✓ (7)

3.2 The addendum is the height of the tooth ✓ above the pitch circle. It is the distance from the pitch circle to the outside diameter. ✓ (2)

3.3 The dedendum is the distance measured from the pitch circle to the root diameter. It is greater than the addendum to allow for clearance. (2)

Copyright reserved 

3.4




| | |
|---|---|
| Correctness | 3 |
| Line work | 1 |

(4)

3.5 The function of the bevel gear is to transmit power✓ to two axles spinning at different speeds. ✓ (2)

**[17]**

## QUESTION 4: CAMS

4.1
- Constant velocity
- Simple harmonic motion
- Uniform acceleration and retardation (3 × 2) (6)

4.2 A cam is a machine element which generally rotates✓ at a uniform speed✓ to produce a controlled up and down movement.✓

OR

A cam is an element✓ that transforms rotary motion✓ into linear motion✓ (3)

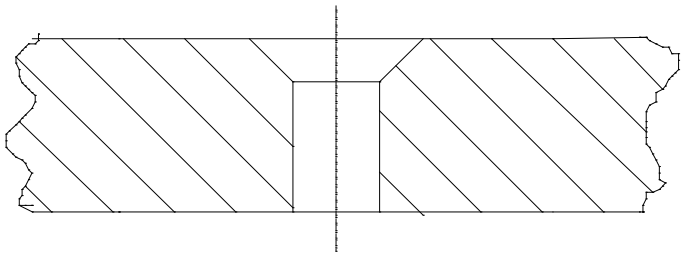
**[9]**

## QUESTION 5: ASSEMBLY AND DETAIL DRAWING

5.1
- Nuts
- Bolts
- Rivets
- Shafts
- Sprockets
- Pins
- Keys
- Washers
- Ribs
- Balls
- Rollers
- Gears (Any 3 × 1) (3)

5.2 KEYWAYS, ASSEMBLY, CONSTRUCTION (3)

5.3



| | |
|---|---|
| Correctness | 3 |
| Line work | 1 |

(4)

5.4 A detail drawing can be considered as the opposite of an assembly drawing.✓ All components are taken apart (stripped) in detail drawings and each item is drawn separately.✓✓

Also

A detail drawing shows all✓ the specific information✓ needed for an item to be manufactured✓ (3)

5.5 It is used to clearly show the hidden details✓ of an object, the solid and hollow parts✓ (2)

5.6 It is used to connect✓ the functional parts of mechanisms and machines✓.

Also

It is used to transmit motion✓ between an element and a rotating shaft✓ (2)

5.7 5.7.1 Tapping is the process in which a hole is drilled✓ using a spiral drill and a thread✓ is then cut into the inside surface of the hole using a tap.✓

5.7.2 Reaming is the removal of a small amount of material✓ from an undersized drilled hole, using a reamer,✓ to produce a hole of accurate size.✓

(2 × 3) (6)

**[23]**

**TOTAL: 75**

Copyright reserved