higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

APPLIED ENGINEERING TECHNOLOGY
NQF LEVEL 4

21 November 2023

This marking guideline consists of 7 pages.

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QUESTION 1

1.1
1.1.1 D
1.1.2 C
1.1.3 C
1.1.4 B
1.1.5 A
1.1.6 B
1.1.7 D
1.1.8 A
1.1.9 C
1.1.10 D

(10 × 1) (10)

1.2
- Provides protection against overload
- Makes up for some degree of misalignment of the shafts
- Connects two parts or shaft units that were manufactured separately
- Provides an easy way to disconnect parts or shaft units for repair and adjustment purposes
- Allows mechanical flexibility
- Provides for instantaneous transmission of power/rotation (Any 4 × 1) (4)

1.3 Mass of cast iron = 90 kg; μ_s = 1,1; μ_k = 0,15; g = 9,81 m/s^2

1.3.1 $F = m \times g$

$F = 90\ kg \times 9{,}81\ m/s^2$✓

Therefore:

$F = 882{,}9\ N$✓

And:

$F\mu_s = \mu_s \times F$

$= 1{,}1 \times 882{,}9\ N$✓

$= 971{,}19\ N$✓ (4)

1.3.2 $F\ \mu_k = \mu_k \times F$

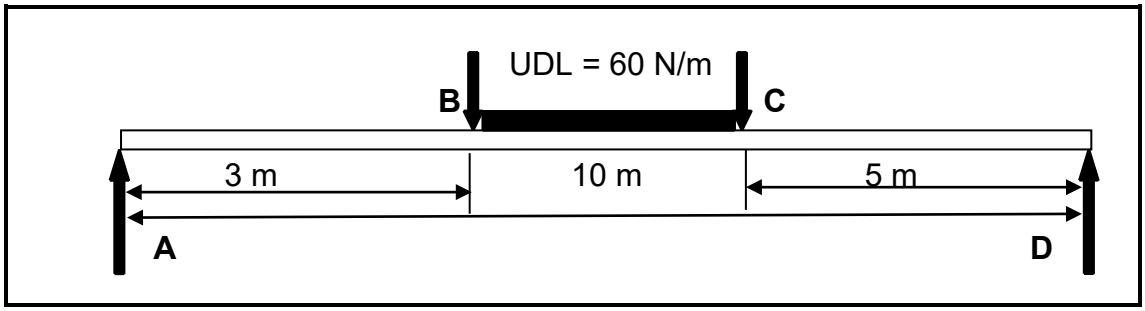
$= 0{,}15 \times 882{,}9\ N$✓

$= 132{,}435\ N$✓ (2)

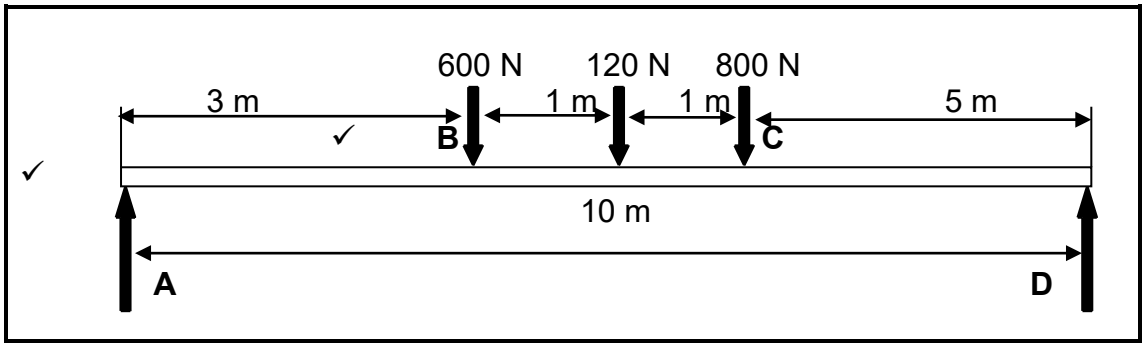
[20]

QUESTION 2

2.1



2.1.1



(2)

2.1.2 Take moments about support A:

Sum of clockwise moments = sum of anticlockwise moments
✓ ✓ ✓ ✓
600 × 3 + 120 × 4 + 800 × 5 = D × 10
1 800 + 480 + 4 000 = 10 D
6 280 = 10 D
D = 628 N✓

Take moments about support D:

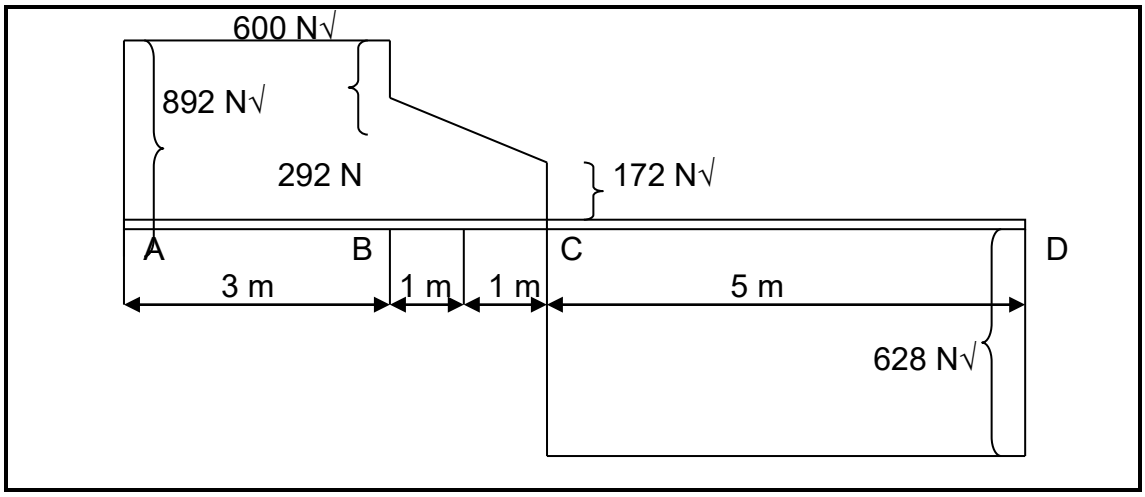
Sum of clockwise moments = sum of anticlockwise moments
✓ ✓ ✓ ✓
A × 10 = 800 × 5 + 120 × 6 + 600 × 7
10A = 4 000 + 720 + 4 200
A = 892 N✓ (10)

2.1.3 Upward forces = Downward forces

628 + 892 = 600 + 120 + 800✓

1 520 N = 1 520 N✓ (2)

2.2

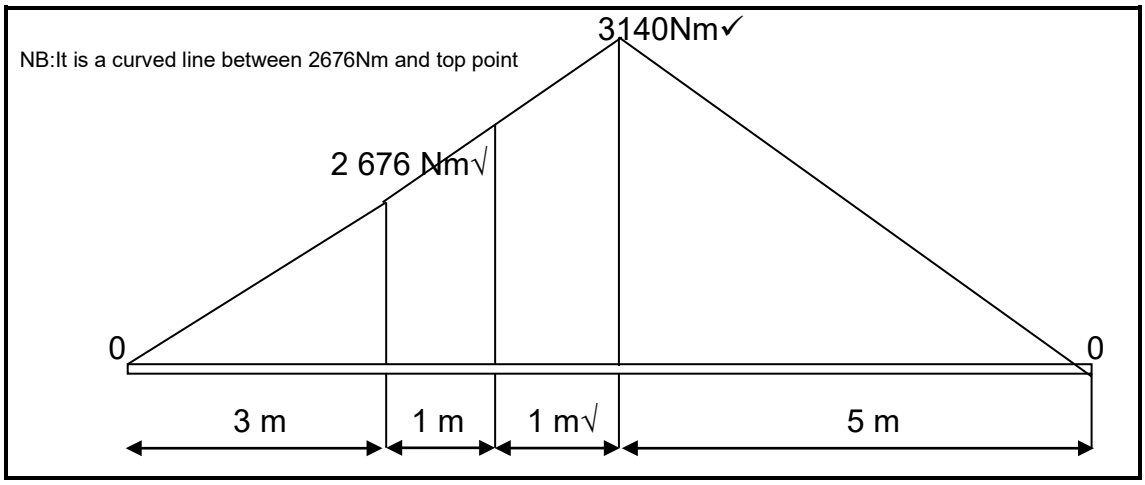


(2)

2.3 Bending moment at:

A = 0 Nm√
B = 892 × 3 = 2 676 Nm√
C = 628 × 5 = 3 140 Nm√
D = 0 Nm√ (½ × 4) (2)

2.4



(2)

2.5 Maximum bending moment = 3 140 N at 5 m from the RHS (2)
[22]

QUESTION 3

3.1

3.1.1	H	
3.1.2	L	
3.1.3	B	
3.1.4	J	
3.1.5	A	
3.1.6	C	
3.1.7	D	
3.1.8	E	
3.1.9	F	
3.1.10	G	
		(10 × 1) (10)

3.2
- Actuator
- Controller
- Process
- Sensor (4)

3.3
- Brushes
- Axle
- Electromagnet/Solenoid
- Commutator
- Armature/Rotor (Any 2 × 1) (2)

3.4
- It makes the design visual.
- It helps communicate ideas.
- It is used to document designs. (Any 2 × 1) (2)

[18]

QUESTION 4

4.1.1 ✓ ✓ solid, gas and liquid.✓ (3)

4.1.2 ✓ When the refrigeration cycle becomes too hot e.g. in the inside of a ✓ refrigerator, the thermostat switches the power on and when it gets too cold it cuts the✓ power supply.✓ (4)

4.1.3 ✓ convection, ✓ radiation and ✓ conduction (3)

4.2
- Mechanical
- Pneumatic
- Hydraulic
- Electrical (4)

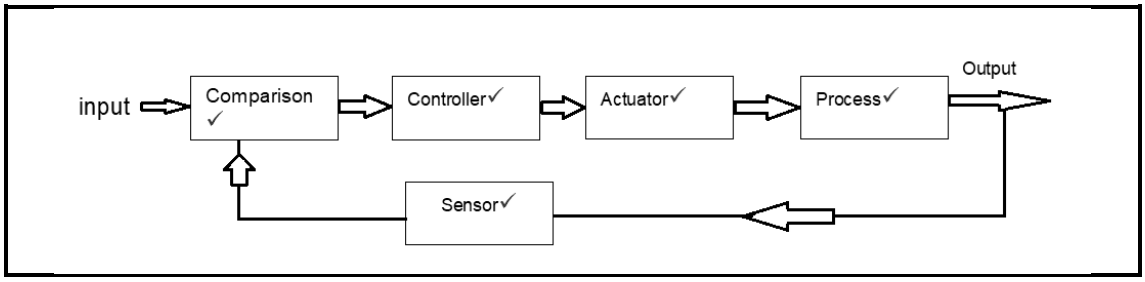
4.3 4.3.1 It is a movement in a straight line, backwards and forwards or up and down e.g. piston in an engine. (2+1)
4.3.2 Oscillating motion is an object that swings backwards and forwards in an arc e.g. a pendulum. (2+1) (6)

4.4 Digital signal is a signal that varies in steps. (1)

4.5 A vacuum is an empty space. Matter is anything that occupies space and has mass. (2 + 2) (4)
[25]

QUESTION 5

5.1



(5)

5.2
- Accuracy required
- Speed of response
- Availability of finance (3)

5.3 A prototype is a model or design that is built to test if the concept can work. (2)

5.4
5.4.1 False
5.4.2 False
5.4.3 True
5.4.4 True
5.4.5 True

(5 × 1) (5)
[15]

TOTAL: 100

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