higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

APPLIED ENGINEERING TECHNOLOGY
NQF LEVEL 4

XX FEBRUARY 2020

This marking guideline consists of 6 pages.

Copyright reserved

QUESTION 1

1.1 A force applied over an area✓ and is measured in Pascal's.✓ (2)

1.2
- Objects hitting the eyes.
- Chemicals and other hazardous materials that can get into the eyes.
- Being struck by swinging objects, such as chains and ropes.
- Looking at bright lights, such as welding sparks or lasers. (4)

1.3
- Walking on the ground.
- Car motion on the ground.
- Driving belts on the engines.
- Stopping of vehicles with friction pads.
- Friction between a tyre and the road allows cars to move and stay on the ground.
- A ball rolling along the ground stopping due to friction. (Any 4 × 1) (4)

1.4 1.4.1 $W = 8 \times 9,81 = 78,48$ N✓

$$\frac{50✓}{78,48✓} = \underline{0,64}✓✓$$

1.4.2 $8 \times 0,7 = 5,6$ N✓

$50 - 5,6 = 44,4$ N✓

$$\frac{44,4✓}{78,48} = 0,57✓✓$$

(2 × 5) (10)
[20]

QUESTION 2

2.1 REACTIONS:

Moment about A:

ACWM = CWM

B x 4 = (20 × 3,5) + (15 × 2,5) + (10 × 2 × 1) ✓

B = 70 + 37,5 + 20

B = 31,87 kN✓

Moment about B:

ACWM = CWM

(10 × 2 × 3) + (15 × 1,5) + (20 × 0,5) = A × 4✓

A = 23,12✓

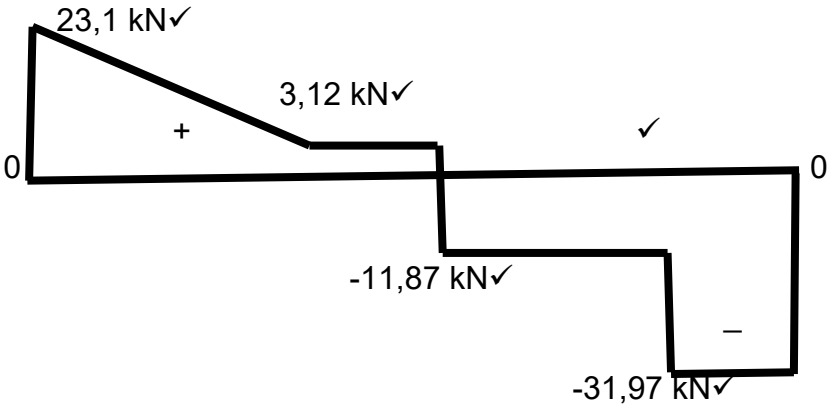
TEST:

F ⇩= F⇧

(10 × 2) + 15 + 20 = 23,12 + 31,87

55 = 55✓

2.2



SHEAR FORCE DIAGRAM

2.3 BMA = 0 kNm✓

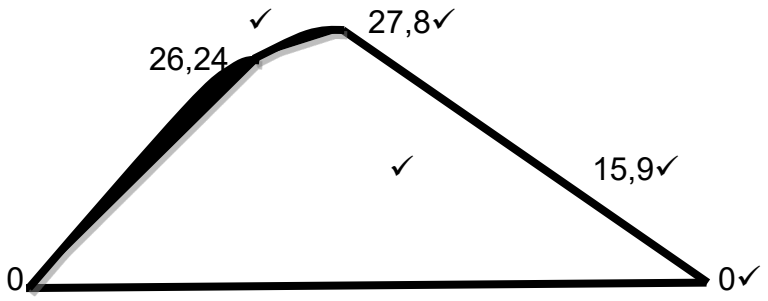
BMB =(23,12 x 2) – (10 × 2 × 1) = 26,24 kNm✓

BMC = (31,87 × 1,5) – (20 × 1) = 27,8 kNm✓

BMD = 31,8 × 0,5 = 15,9 kNm✓

BME = 0 kNm✓

2.4



BENDING MOMENT DIAGRAM

(4 × 5) **[20]**

QUESTION 3

3.1
3.1.1	C
3.1.2	H
3.1.3	I
3.1.4	A
3.1.5	B
3.1.6	D
3.1.7	J
3.1.8	G
3.1.9	F
3.1.10	E

(10 × 1) (10)

3.2
- Work control
- Quality and process control
- Cost control
- Effective reporting and feedback system (4)

3.3
- Leave a clean and dry surface, free from moisture or dry waste
- Do not leave a build-up of cleaning products
- Maintain the slip-resistant properties of the floor/surface (3)

3.4
- Disc brakes
- Drum brakes
- Anti-lock brakes
- Emergency brakes
- Park brakes
- Exhaust brakes
- Spring brakes (Any 3 × 1) (3)

[20]

QUESTION 4

4.1 Pressure = density × g × h✓ h = 3/2 = 1,5 m✓

Pressure = 1,5 × 9,81 × 1,5✓

Pressure = 22,07 Pa✓ (4)

4.2
- Class I
- Class II
- Class III (3)

4.3
- People have to raise their voices.
- People have ringing in their ears at the end of the shift.
- People experience temporary hearing loss when leaving work. (3)

4.4
- Bronze
- Polytetrafluoroethylene (PTFE)
- Oilyte
- Plastic
- Babbitt (Any 4 × 1) (4)

4.5
4.5.1 True
4.5.2 False
4.5.3 True
4.5.4 True
4.5.5 False
4.5.6 False

(6 × 1) (6)

[20]

QUESTION 5

5.1
- Compressor✓ – compresses low pressure refrigerant vapour from the evaporator and compresses it into high pressure vapour✓.
- Condenser✓ – a device or unit used to condense a substance from its gaseous to its liquid state✓.
- Evaporator✓ – a device in a process used to turn the liquid form of a refrigerant into its gaseous form✓.
- Metering device✓ – a device responsible for feeding the proper amount of refrigerant into the evaporator coil.✓ (4 × 2) (8)

5.2 A stepper motor consists of a specially wound armature✓ that enables the rotor to move precisely to any angular position, often combined with a gear box.✓ A stepper motor provides a way of producing precise movement from a digital input signal to the rotor shaft one step at a time.✓ Stepper motors are widely used in the control of machinery, as well as printers, plotters, robots and disk drives.✓ (4)

5.3
- Ball valve
- Gate valve
- Butterfly valve
- Globe valve
- Check valve
- Plug valve (6)

5.4 Thermodynamics is a discipline in physics and chemistry✓ that studies the effects of changes in temperature, volume and pressure in industrial systems.✓ (2)

[20]

TOTAL: 100

Copyright reserved