higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

BUILDING SCIENCE N3

23 November 2023

This marking guideline consists of 8 pages.

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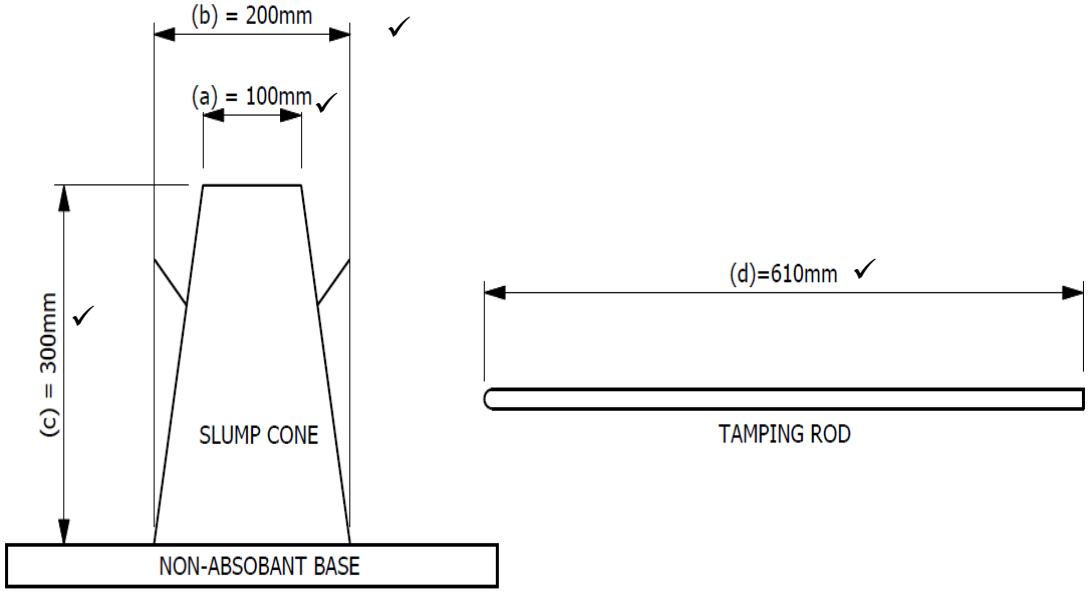
QUESTION 1

1.1 A slump test is used to determine the workability of a fresh concrete mix. (1)

1.2 Initial drying shrinkage is the **largest amount of shrinkage**✓ that takes place during the setting and hardening process. (1)

1.3



(4)

1.4



(A) Flaking or peeling✓



(B) Blistering✓



(C) Cissing✓

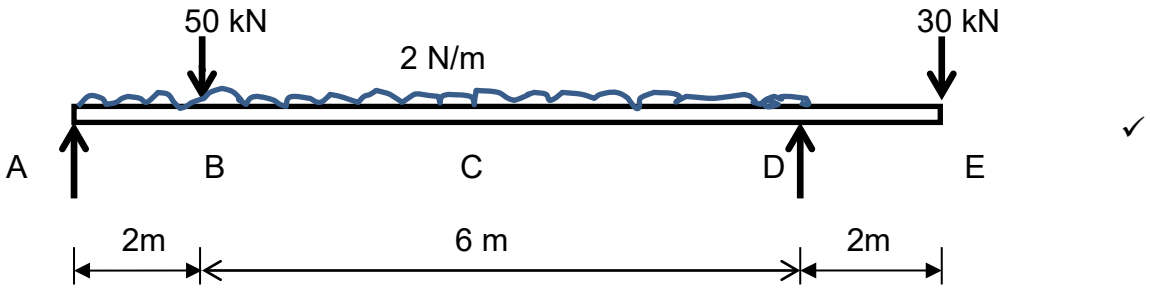


(D) Curtaining/Crinkling/Sagging✓

(4)
[10]

QUESTION 2

2.1



(1)

Taking moments about RL
(2 × 2 × 1) + (50 × 2) + (2 × 3 × 3,5) + (2 × 3 × 6,5) + (30 × 10) = 8RR✓
RR = 58KN✓ (2)

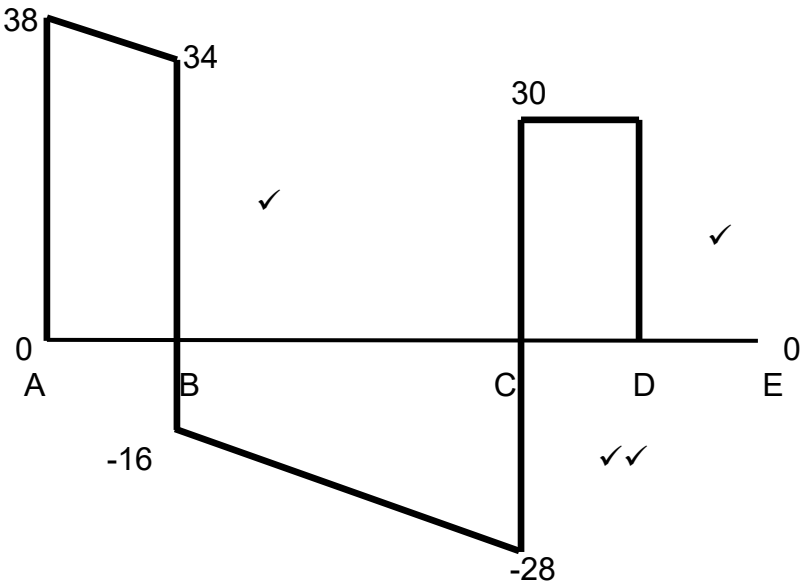
Taking moments about RR
8RL + (30 × 2) = (2 × 3 × 1,5) + (2 × 3 ×1,5) + (2 × 3 × 4,5) + (50 × 6) + (2 × 2 × 7)✓
RL = 38 kN✓ (2)

2.2 BM_A = 0 Nm

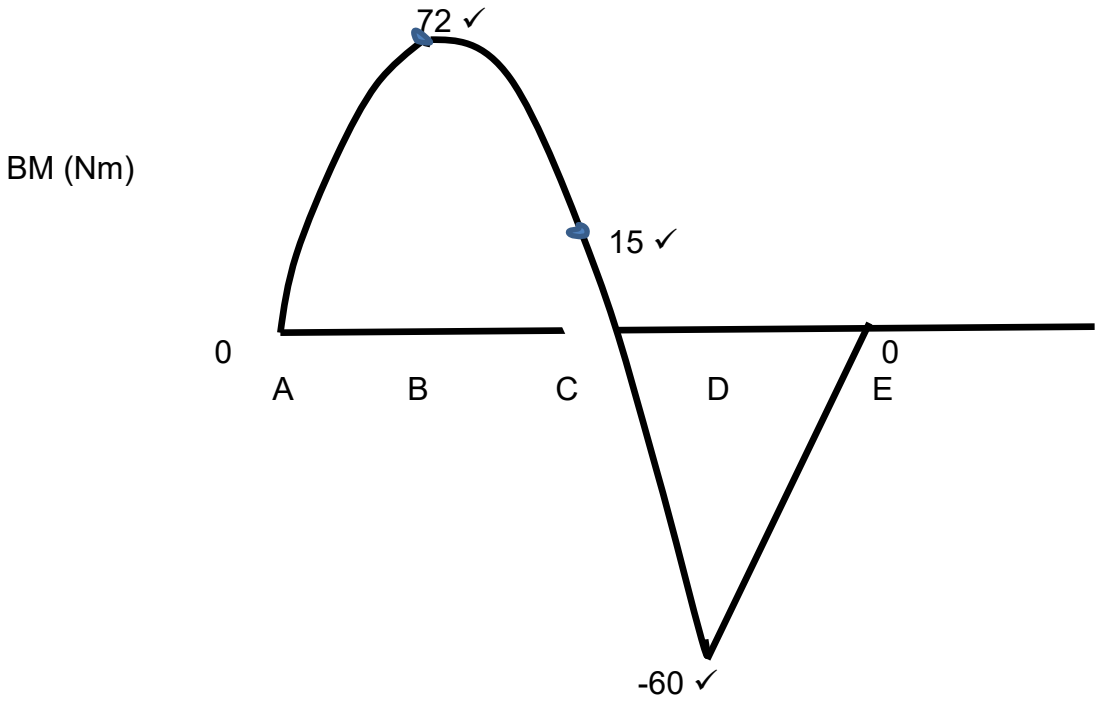
BM_B = (38 × 2) + (-2 × 2 × 1) = 72 kN/m✓
BM_C= (38 × 5) + (-2 × 2 × 4) + (-50 × 3) + (-2 × 3 × 1,5) =15 kN✓
BM_D = (38 × 8) + (-2 × 2 × 7) + (-50 × 6) + (-2 x 3 × 4,5) + (-2 × 3 × 1,5) = -60 N✓ (3)

2.3

SF (N)



(4)



(3)
[15]

QUESTION 3

3.1 3.1.1 Taking moments about the left-hand reaction

$R_L \times 4 = 1 \times 1,5 + 62 \times 3$✓

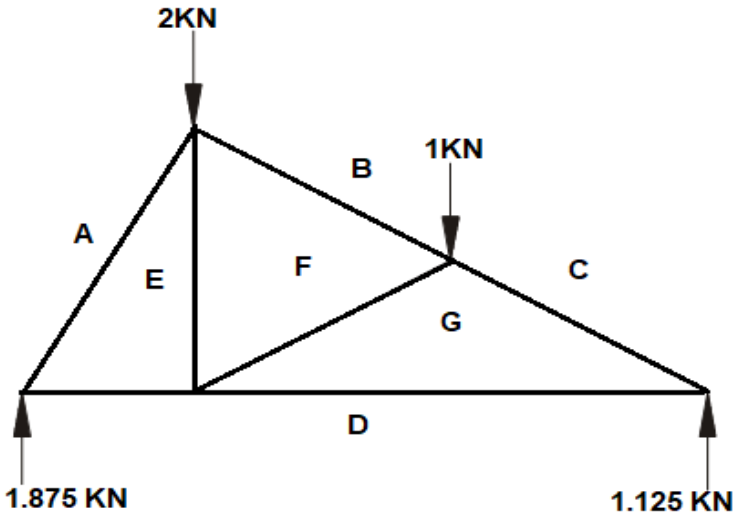
$\therefore R_L = 1.875kN$✓ (2)

3.1.2 Taking moments about right-hand reaction

$2 \times 1 + 1 \times 2,5 = R_R \times 4$ ✓

$\therefore R_R = 1,125\ kN$✓ (2)

3.1.3

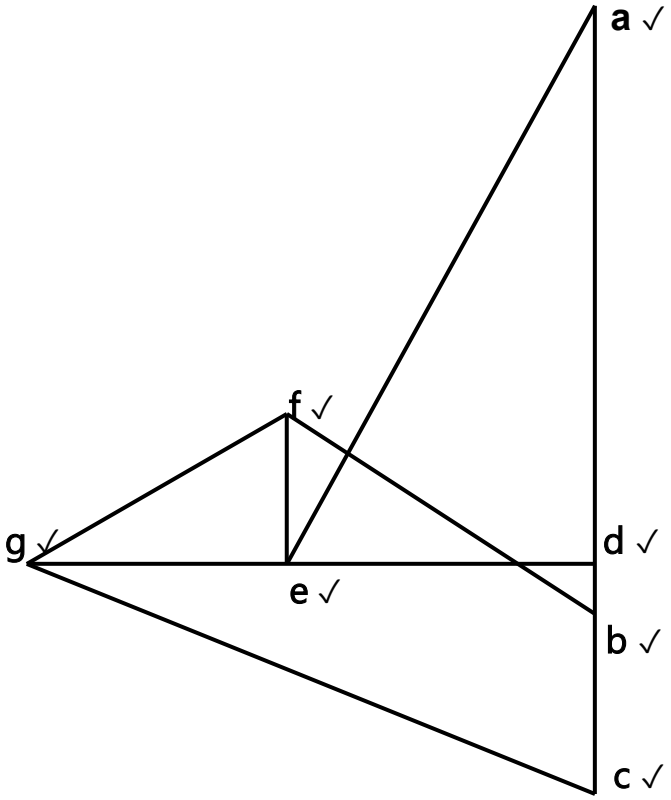


(2)

3.2

MEMBER	MAGNITUDE	NATURE
AE	2,165 ½ ✓	Strut ½ ✓
BF	1,25 ½ ✓	Strut ½ ✓
CE	2,25 ½ ✓	Strut ½ ✓
DE	1,95 ½ ✓	Tie ½ ✓
DG	1,08 ½ ✓	Tie ½ ✓
FG	0,5 ½ ✓	Tie ½ ✓
EF	1 ½ ✓	Tie ½ ✓

+/- 3 tolerance (7)



(7)
[20]

QUESTION 4

SHAPE	AREA (mm^2)	X (mm) From AC	Y (mm) From AB	AY (mm^3)	AX (mm^3)	Marks
(1)	1 080 ½✓	90½✓	261½✓	281 880½✓	97 200½✓	(2 ½)
(2)	720 ½✓	90½✓	198½✓	142 560 ½✓	2 160½✓	(2 ½)
(3)	1 080½✓	90½✓	135 ½ ✓	145 800½✓	97 200½✓	(2 ½)
(4)	1 080½ ✓	90½✓	129 ½ ✓	139 320½✓	97 200½✓	(2 ½)
(5)	720½ ✓	90½✓	66½✓	47 520½✓	2 160½✓	(2 ½)
(6)	1 080½ ✓	90½✓	3 ½ ✓	3 240½✓	97 200½✓	(2 ½)
TOTAL	5 760 ✓			760 320½✓	393 120½✓	(2)

(18)

$y = \Sigma Ay/\Sigma A$
$= 760\ 320\ 5\ 760$ ½ ✓
$= 132$ mm ✓

$x = \Sigma Ax/\Sigma A$
$= 393\ 120/5\ 760$ ½✓
$= 68{,}25$ mm ✓

(3)
[21]

QUESTION 5

5.1 Parallel component = $W\sin\theta$
$= 33 \times 9{,}81 \times \sin 30^0$✓
$= 161{,}87$N✓ (2)

5.2 Perpendicular component = $W\cos\theta$
$= 33 \times 9{,}81 \times \cos 30^0$✓
$= 280{,}36$N✓ (2)

5.3 $F_\mu = \mu W\cos\theta$
$= 0{,}5 \times 280{,}36$✓
$= 140{,}18$ N ✓ (3)

5.4 $F_{down} = \mu W\cos\theta - W\sin\theta$✓
$= 140{,}18 - 161{,}87$✓
$= 21{,}69$ N✓ (2)

5.5 $F_{up} = \mu W\cos\theta + W\sin\theta$
$= 140{,}18 + 161{,}87$ ✓ (3)
$= 302{,}05$ N ✓ **[12]**

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QUESTION 6

6.1 6.1.1 MCB protects a circuit by tripping or switching off✓ in case of an overcurrent or earth leakage.✓ (2)

6.1.2 Fuses protect the circuit by blowing (melting the fuse)✓ in case of an over current, thereby breaking the circuit, thus preventing the flow or electricity.✓ (2)

6.2 Requirements for placing distribution boards in a building:

- Must be situated in an easily accessible place.
- Must not be installed in a bathroom or in humid place.
- There must be clear unobstructed space in front of it.
- Maximum height above finished floor level should be 2,2 m.
- A minimum height from finished flow level should be 1,2 m.
- Protected against corrosion.
- Comply fully with the requirements of SANS10142.

(Mark any FOUR) (4)

6.3 Alternating current refers to current that reverses the direction of flow✓or changes the direction of flow and is generated from sources like a generator.
Direct current refers to electric current that flows in one direction✓ and is generated from sources like a battery. (2)

[10]

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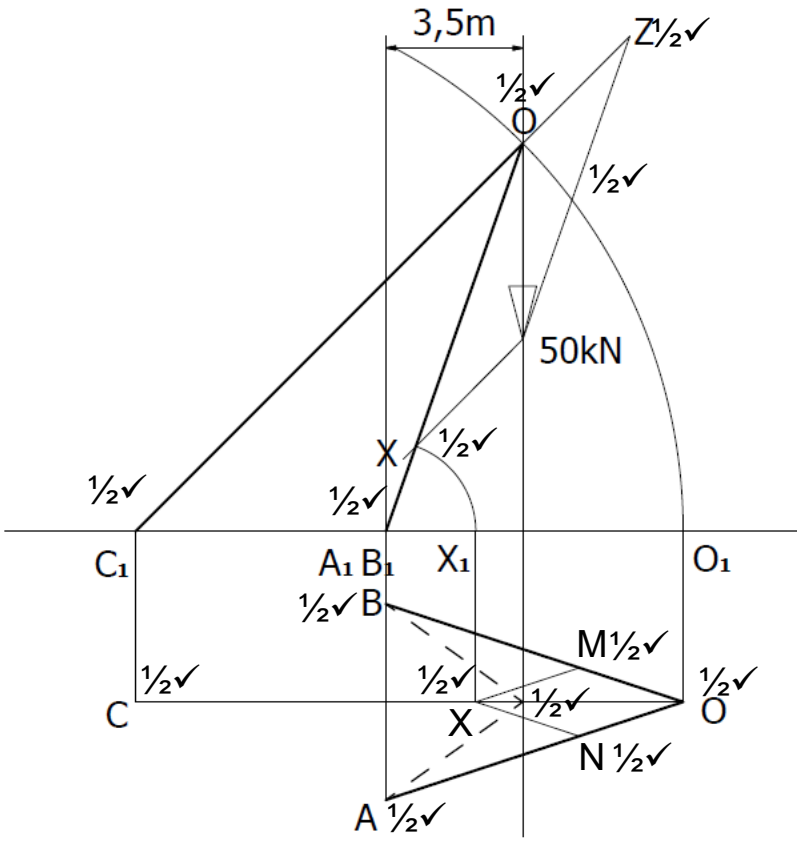
QUESTION 7



OZ = FORCE IN BACKSTAY = 38.7kN ✓
ON = FORCE IN LEG OA = 27.9kN ✓
OM = FORCE IN LEG OB = 27.9kN ✓ (10)

+/- 3 tolerance Correctness of sketch = 2 marks (2)

[12]

TOTAL: 100

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