higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

CIVIL AND STRUCTURAL STEELWORK DETAILING

(First paper)

NQF LEVEL 4

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This marking guideline consists of 4 pages.

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QUESTION 1

1.1 1.1.1 TAKE MOMENTS ABOUT A

$$\sum CWM = \sum ACWM$$

$3x2x1 + 4x4x4 + 10x6 + 25x10 = E\ x10$✓
$6 + 64 + 60 + 250 = 10E$
$70 + 60 + 250 = 10E$
$380 = 10E$✓
E = $380/10$
=38kN✓

TAKE MOMENTS ABOUT E

$$\sum CWM = \sum ACWM$$

$Ax10 = 10x4 + 4xx4x6 + 3x2x9 + 20x10$ ✓
$10A = 40 + 96 + 54 + 200$
$10A = 390$
$A = \frac{390}{10}$✓

= 39 kN ✓ (6)

1.1.2 Upward F = Downward F ✓
A+E = 20 + 6 +16 + 10 + 25 ✓
39 + 38 = 77 ✓
77 = 77 ✓

(4 × 1) (4)

1.2 1.2.1 E
1.2.2 G
1.2.3 A
1.2.4 B
1.2.5 D

(5 × 1) (5)
[15]

QUESTION 2

2.1 b − Beam width
c − Compression side
d − Neutral Axis
h − Beam height
T − Tension side
x − rebar (6)

2.2 2.2.1 True slump: It is most desirable
2.2.2 Zero slump: It doesn't collapse on lifting the slump mould
2.2.3 Collapsed slump: when the entire cone flattens
2.2.4 Shear slump: when one half of the concrete cone collapses.
(4 × 2) (8)

2.3 A cantilever retaining wall has a reinforced✓ vertical structure,✓ with a toe and tail as horizontal structures embedded underneath the earth.✓✓ (4)

2.4
- The structure is a concrete box culvert. ✓
- The primary functions is to convey water passage✓ underneath roadways✓, bridges,✓and along the sides of roads. (4)

2.5 $0{,}45\sigma_c bx$ ✓ $= 0{,}87\sigma_y A_{st}$✓
$0{,}45(25)\ (400)(187{,}84)$ ✓ $= 0{,}87(450)A_{st}$✓
845280 ✓ $= 391{,}5A_{st}$✓
$2159\ mm^2$✓✓ (8)
[30]

QUESTION 3

3.1 Cat ladders are ladders with safety cages✓ that are used to access the tops of high-rise buildings.✓ (2)

3.2 The two perform the same function✓ except that a beam capping transfers loads to a number✓ of closely spaced columns whereas a normal beam deals with fewer✓ columns. The only difference is in the **design**✓ of capping beams because of the columns that are spaced so much closer compared to normal beams. (4)

3.3 A − handles/standard mould✓✓
B − foot rest✓
C − steel base plate✓
D − tampering rod✓ (5)

3.4 A tread plate is a thin✓ steel section with extruding patterns✓ while a rectangular grid is thicker✓ and has rectangular holes that lend frictional support. These are designed to offer a non-slip surface,✓ while still allowing for proper draining and cleaning of working surfaces.✓ (5)

3.5
- Sand
- Stone
- Cement
- Water
- Additives (Any 4 × 1) (4)

3.6
- Provides tensile strength to the concrete, allowing the structure to become strong in both tension and compression.
- Generally very easy to handle, manipulate, and weld — both on the factory floor and job site.
- Steel rebar is favoured because it remains elastic and ductile even under very heavy force or loads.
- Steel reinforcement gives warning prior to failure.
- Reduces the high risk of long cracks in concrete once they occur. (5)

3.7 A − Guard rail
B – Tread
C − Stringer
D – Riser
E − Platform/vastap (5)

[30]

TOTAL: 75

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