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 3

7 NOVEMBER 2022

This marking guideline consists of 5 pages.

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This marking guide serves as a mere guideline and is not absolute. Alternative correct answers must be considered.

QUESTION 1

1.1 1.1.1 Concrete: A composition of aggregate,✓ cement and water used for building.✓

1.1.2 Concrete cover: A layer of concrete that protects steel bars from moisture that will cause them to rust,✓ and from the heat of a fire that could degrade them and lead to structural collapse.✓

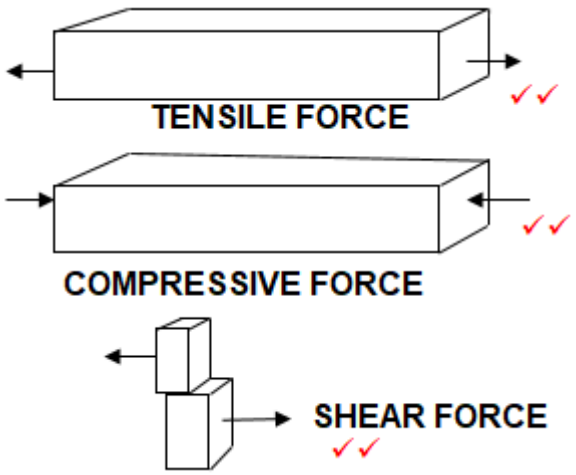
1.1.3 Stirrups: Stirrup-shaped steel bars that hold the longitudinal steel bars✓ of columns and beams in place.✓

(3 × 2) (6)

1.2 1.2.1 Concrete cover
1.2.2 Bottom bars/compression bars
1.2.3 Hanger bars/tension bars
1.2.4 Stirrup

(4 × 1) (4)

1.3



(3 × 2 marks) (6)
[16]

QUESTION 2: REINFORCED CONCRETE DETAILING

2.1 2.1.1 Together
2.1.2 Alternative bars reversed
2.1.3 Staggered
(3 × 1) (3)

2.2 Steel✓ – to withstand tension✓
Concrete✓ – to withstand compression✓ (4)

2.3 Slab: Only one bar of each type should be shown in full in plan,✓ but all should be shown in cross-section. The exception for slabs is when bars are staggered or alternate bars are✓ reversed. In these cases, a pair of bars should be drawn in full. (2)

2.4 Advantages of using steel
- There is no difference in the thermal expansion of steel and that of concrete.✓✓
- Relatively thin steel bars can be used to reinforce concrete.✓✓
- Rebars can be joined easily.
- Relatively simple skills are required.
- Good availability of steel products.
- Steel can carry compression.
- Steel has good ductility.
- Steel is very strong compared to other reinforcing materials. (Any 2 × 2) (4)

2.5 Types of footing
- Raft footing
- Wall footing
- Isolated footing
- Combined footing
- Wall footing (Any 3 × 1) (3)

2.6 A structural engineer designs buildings or structures that will be able to withstand pressure.✓ He also manages, supervises and visits contractors✓ in the field to ensure that all plans are followed accurately.✓ (3)
[19]

QUESTION 3: STRUCTURAL STEELWORK DETAILING

3.1
a. Shoe eave
b. Rafter node
c. Apex
d. Apex haunch
e. Ridge
f. Main tie
g. Wall cross bracing
h. Building length
i. Live span
j. Column/or
k. Concrete foundation (10)

3.2
- Pratt truss
- Mono-pitch truss
- Saw tooth truss (3)

3.3
- It has the disadvantage of being corrosive.✓✓
- It is less fire resistant than precast concrete.✓✓ (4)

3.4
- Slab base
- Gusseted base
- Pocket base (3)

[20]

QUESTION 4: WELDING

4.1
4.1.1 D
4.1.2 C
4.1.3 E
4.1.4 B
4.1.5 A

(5 × 1) (5)

4.2
- A welding hood
- Leather gloves
- A leather apron
- Leather shoes/spats (4)

4.3
- The welding methods
- The base metal
- The filler metal
- The flux
- The design of the joint (5)

4.4 4.4.1 Manual metal arc welding

4.4.2 Electro slag welding

(2 × 1) (2)

4.5
- Aluminium
- Carbon steel
- Copper
- Low-alloy steels
- Magnesium
- Nickel
- Titanium

(Any 4 × 1) (4)
[20]

TOTAL: 75

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