higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

CONCRETE STRUCTURES
NQF LEVEL 2

(12020132)

22 November 2018 (X-Paper)
09:00–12:00

Calculators may be used.

This question paper consists of 6 pages.

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TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. Read ALL the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Write neatly and legibly.

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QUESTION 1: INTRODUCTION TO FORMWORK AND FALSEWORK

1.1 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (1.1.1–1.1.6) in the ANSWER BOOK.

1.1.1 Formwork is a temporary structure or mould into which liquid concrete is placed and compacted to harden.

1.1.2 Stay-in-place formwork is also called fixed formwork.

1.1.3 Honey-combs are formed in concrete when the cement part escapes through openings while the wet concrete is placed.

1.1.4 A releasing agent is the person on a building site who fires the labourers who do not do their work.

1.1.5 Scaffolding is a temporary structure of poles and boards installed to allow for construction workers to work and use material on a higher level.

1.1.6 Cement does not need to be protected and can be stored anywhere as it is sold in 50 kg paper bags.

(6 × 1) (6)

1.2 You are required to construct formwork.

Name FOUR requirements that the formwork should comply with. (4)

[10]

QUESTION 2: FORM FACE MATERIALS AND SPECIAL TYPES OF FORMS

2.1 Name TWO advantages of moving flying table forms by crane. (2)

2.2 Complete the following sentences by using the words provided in the list below. Write only the word(s) next to the question number (2.2.1–2.2.8) in the ANSWER BOOK.

horizontal; side; large; crane; edge; rolled; multi-storey; slab

Flying table form systems consist of (2.2.1) … formwork tables that are reused on multiple storeys of a building without being taken apart. A flying form system is ideal for use in the construction of (2.2.2) … buildings, where the forms need to be re-used many times. The crane approach consists of producing tables with a (2.2.3) … formwork area that can only be moved up a level by (2.2.4) … . After the concrete has cured, the tables are lowered and moved on rollers or trolleys to the (2.2.5) … of the building. The protruding table is lifted by crane while the rest of the table is (2.2.6) ... out of the building. When the table's centre of gravity is out of the building, the table is flown to the next level or position. A crane-lifting platform or an elevator may also be used to move table forms. Using this method tables are either lifted by a crane transport fork or by material platform elevators attached to the (2.2.7) ... of the building. They are usually transported (2.2.8) ... to the elevator or crane-lifting platform with shifting trolleys. Final positioning adjustments can be made by trolley. (8)

[10]

QUESTION 3: PRESSURES RESISTED BY FORMWORK AND FALSEWORK

3.1 Calculate the pressure at the bottom of liquid concrete in a container with a height of 2 m. The density of the concrete is 2 000 kg/m^3 and the gravity force is 9,81 m/s^2. Give the answer in kPa. (5)

3.2 Give FOUR reasons why concrete form ties are sometimes used in formwork. (4)

3.3 Give FOUR reasons why props may buckle or collapse. (4)

3.4 Define the term *reshores.* (2)

[15]

QUESTION 4: ERECTING FORMWORK AND FALSEWORK

4.1 Make a neat, simple top-view drawing to illustrate the support work and formwork for an L-shaped wall. Your drawing must indicate the following sections and parts of the structure: waler, soldier, ferrule tie, kicker block, stay, cross brace, strong back and strap. Label your drawing clearly. (10)

4.2 FIGURE 2 shows part of a concrete beam and slab. Copy and complete this figure in the ANSWER BOOK and show what the wooden formwork would look like, complete with a prop, uprights, cleats and deck boards. Label the drawing clearly.



(10)

4.3 Explain the use of a trammel by using a neat, labelled drawing. (5)
[25]

QUESTION 5: VERTICAL STOP ENDS, WATER STOPS AND JOINTS

5.1 Explain under what circumstances one would use the following types of joints:

5.1.1 Joggle joints

5.1.2 Construction joints with starter bars

5.1.3 Expansion (isolation) joints

5.1.4 Contraction (control) joints

(4 × 2) (8)

5.2 Name TWO types of materials of which water stops are manufactured. (2)
[10]

QUESTION 6: USING RELEASING AGENTS

6.1 Define the term *releasing agent.* (2)

6.2 Name FIVE characteristics of a good releasing agent. (5)

6.3 Name THREE instances when releasing agents must be applied to the formwork faces. (3)
[10]

QUESTION 7: WORKMANSHIP AND DETAILING IN CONCRETE STRUCTURES

7.1 Choose the correct word(s) from those given in brackets. Write only the word(s) next to the question number (7.1.1–7.1.6) in the ANSWER BOOK.

7.1.1 Insufficient concrete cover depth is the most important cause of poor (durability/adhesion) of reinforcement. (1)

7.1.2 When steel rusts it (contracts/expands) and causes concrete covers to crack. (1)

7.1.3 One of the reasons why inadequate concrete cover could occur is the (abnormal/normal) deterioration of concrete. Concrete (even if it is good) deteriorates from the (outside inwards/inside outwards). (2)

7.1.4 Another reason for having too little concrete cover is the use of incorrect or insufficient (reinforcement/tolerances). (1)

7.1.5 A further reason for having too little concrete cover is the effect of (torsional/dimensional) tolerances on the concrete cover. (1)

7.1.6 Some other reasons for inadequate concrete cover are the use of wrong spacers or too (many/few) spacers, and using steel or formwork that is out of (tolerance/alignment). (2)

7.2 Draw a neat horizontal section through the structure of a stop-end for a thin and a wider concrete wall. Your drawing must indicate the following parts: through bolt or ferrule tie; soldier; kickers; shutter board. Label the drawing clearly. (10)

7.3 Curing is the process to slow down the evaporation of water from concrete.

Name TWO methods for curing concrete. (2)
[20]

TOTAL: 100

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