higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

CONCRETE STRUCTURES
NQF LEVEL 2

(12020132)

12 MARCH 2018 (X-Paper)
09:00–12:00

Calculators may be used.

This question paper consists of 7 pages.

NCV

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

1.1 Discuss the important dates of discovery and development of Portland cement under the topics in question 1.1.1 – 1.1.4. Write only the answer next to the question number (1.1.1 - 1.1.4) in the ANSWER BOOK.

1.1.1 Joseph Aspdin (2)

1.1.2 I k. Brunel (2)

1.1.3 W B Wilkinson (2)

1.1.4 George Bartholomew (2)

1.2 Explain the difference between a concrete beam and a concrete column. (4 x ½) (2)

[10]

QUESTION 2

2.1 When using timber as a construction material for formwork, the moisture content of the timber must be stabilized between a value of 15% and 20%.

Give TWO reasons why the moisture content of timber formwork must be stabilized. (2)

2.2 Give TWO reasons why timber shutters should be coated with a good resin that will not react with the concrete. (2)

2.3 Explain the term *plywood.* (2)

2.4 Explain the term *void forms.* (4)

[10]

QUESTION 3

3.1 A concrete block with a base area of 3 m^2 and a height of 1,5 m is used as a counter weight on a crane.

Determine the mass of the block if the density of concrete is 2 000 kg/m^3
Use the formula $m = \rho \times v$ (5)

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3.2 Complete the following sentences by using the words in the list below. Write only the missing word next to the question number (3.2.1–3.2.5) in the ANSWER BOOK.

stiffening; pressure; greater; self-supporting; reducing

3.2.1 The greater the density of concrete, the greater the … exerted on the form face.

3.2.2 A mix with a low workability (small slump) will be stiffer and therefore more … than a mix with a high workability (large slump).

3.2.3 A slow rate of pouring concrete enables the lower levels to start stiffening before the pour is complete, thus … the pressure in the concrete.

3.2.4 Discharging concrete from a height causes a surge, or impact loading, which exerts … pressure than a discharge closer to the formwork.

3.2.5 High temperatures increase the … and setting of concrete, while low temperatures have the opposite effect.

(5 × 1) (5)

3.3 Explain TWO different loads that formwork and false work have to resist. (4)

3.4 Explain why the compacting of concrete with a poker vibrator will increase the pressure on formwork. (1)

[15]

QUESTION 4

4.1 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (4.1.1–4.1.5) in the ANSWER BOOK.

4.1.1 In formwork, soldiers are tall narrow pieces of timber or steel that stiffens and increase the strength of the formwork by means of extra support.

4.1.2 Walling is the vertical sides of a building, constructed of concrete or bricks.

4.1.3 If one does not have steel props on a building site, one can also use steel standards with a jack to perform the same task.

4.1.4 Detailed scale drawings are specific plans which will give specific instructions to the construction team on a building site.

4.1.5 Steel reinforcement tends to provide support for concrete and therefore increases pressure.

(5 × 1) (5)

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4.2 Make a neat labeled sketch to show how twisted wire is used to tie formwork together. (6)

4.3 Give TWO advantages when using adjustable props. (2)

4.4 Demonstrate by means of a neat, labeled sectional drawing the support structure and decking for a concrete slab situated between two existing columns.

The drawing must include the following detail:

- Sole plates
- Jacks
- Props
- Ledgers
- Bearers
- Decking
- Transom
- The two existing columns (12)

[25]

QUESTION 5

5.1 Give the appropriate procedure or method that you would use to prepare or to form a construction joint in each of the following cases:

5.1.1 When the concrete is not more than 24 hours old (2)

5.1.2 When the concrete is more than 24 hours old, but not more than three days old (3)

5.1.3 When the concrete is more than three days old (2)

5.2 Complete the following sentences by using the words in the list below. Write only the words next to the question number (5.2.1–5.2.3) in the ANSWER BOOK.

movement joints; designated joints; expansion joints

5.2.1 … are also known as isolated joints and are intended to allow independent movement between adjoining parts.

5.2.2 … allow relative movement of structural parts that are situated next to each other in a controlled or uncontrolled way without affecting the quality or working of the structure.

5.2.3 … are specific joints that have been specified by the designer and planner for a particular job.

(3 x 1) (3)

[10]

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QUESTION 6

6.1 State FOUR precautions that need to be taken when working with or handling releasing agents. (4)

6.2 Name FOUR release agents commonly used in the building industry. (4)

6.3 Many people use old engine oil as a releasing agent.

Explain why old engine oil is not environmentally friendly. (2)

[10]

QUESTION 7

7.1 Make a neat labeled, horizontal sectional sketch through the formwork of a square concrete column that will demonstrate the construction to reduce grout leakage. (7)

7.2 Choose an item from COLUMN B that matches a description in COLUMN A. Write only the letter (A–E) next to the question number (7.2.1–7.2.5) in the ANSWER BOOK.

COLUMN A		COLOUMN B	
7.2.1	Beam and wall sides can be removed after one day with a cement strength class of 42.5 R	A	9.5 days
7.2.2	Slab forms with props left underneath can be removed after three days with a cement strength class of 42.5 R	B	15° - 32°
7.2.3	Slab props including cantilevers can be removed after five days with a cement strength class of 42.5 R	C	5 days
7.2.4	Beam props can be removed if the average ambient temperature is 19° with a cement strength class of 42.5 R	D	cold weather
7.2.5	Beam soffits can be removed with the props left underneath if the minimum ambient temperature is 5° with a cement strength class of 42.5 R	E	hot weather

(5 x 1) (5)

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7.3 Describe, in your own words, what you understand by the term *curing* of concrete and the possible consequences when curing is neglected. (4)

7.4 Explain the term *steel reinforcing cover* in concrete structures. (2)

7.5 State TWO factors that can influence insufficient steel reinforcing concrete cover in concrete structures. (2)

[20]

TOTAL: 100

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