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NASIONALE SENIOR SERTIFIKAAT-EKSAMEN

# JUNE EXEMPLAR 2008

# CIVIL TECHNOLOGY

**IXESHA: 3 iiyure** | **TIME: 3 hours** | **TYD: 3 uur**
**AMANQAKU: 200** | **MARKS: 200** | **PUNTE: 200**

*Write on the cover of your answer book, after the word "Subject" –*
**CIVIL TECHNOLOGY**

This examination paper consists of 7 pages + an answer set of 4 pages.

## INSTRUCTIONS AND INFORMATION

1. This paper consists of FIVE questions. Answer ALL the questions.
2. Start each question on a new page.
3. Sketches may be used to illustrate your answers.
4. Write your NAME on the ASWER SHEETS and hand in with your ANSWER BOOK.
5. Write neatly and legibly.

## QUESTION 1

1.1 Figure 1.1 on answer sheet A show the floor plan of a one bedroom flat with a gable roof construction.
You are a draughtsman at an architect company and are given the following instructions by the chief architect:
The assignments must be done on sheet A and must be according to standard building practices.

1.1.1 Show all the necessary measurements at the NORTHERN and EASTERN sides of the flat. (8)

1.1.2 Draw the symbols of the outer and inner walls in the openings, 1.1 A and 1.1 B. (4)

1.1.3 Draw to scale 1:100 the SOUTHERN view of the flat. (16)

1.2 Figure 1.2 on sheet B shows the incomplete drainage plan.
Complete the drainage plan by drawing the pipework, access openings, symbols and abbreviations. (11)

1.3 What scale is used to draw drainage plans? (1)

**[40]**

## QUESTION 2

2.1 You are a carpenter and you are asked by a client to make roof trusses for his double garage.

2.1.1 Draw to scale 1:50 a line diagram of a fink truss with span of 6 meters.
The truss has a pitch of 30° with a 500 mm overhang.
Label all the parts on the drawing. (10)

2.1.2 Name two methods that can be used to join the different parts of a roof truss. (2)

2.1.3 Make a list of quantities for the construction of the fink truss that you have drawn.
All parts are made of 114 mm x 38 mm pine wood. (10)

2.2 Explain how you will erect and fasten the trusses. (4)

2.3 Name the different ingredients of a concrete mixture and show the specific order how they are indicated. (4)

2.4 Explain how water influences the strength of concrete. (2)

2.5 Name TWO reasons why lime is sometimes added to a mortar mix. (2)

2.6 Explain the difference between mass concrete and reinforced concrete. (2)

2.7 An engineer wants to design a beam for a structure. He chose concrete as the material to be used.
Name any FOUR advantages of concrete as construction material. (4)
**[40]**

**QUESTION 3**

3.1 Draw to a scale 1:10 the closed eaves of a roof with an overhang of 500 mm.The roof is covered with corrugated asbestos and the eaves with 3 mm flexite and rounded off with half round quadrant.
Show a portion of the 220 mm external wall and the ceiling with cornice. (13)

3.2 Name TWO uses of the angle grinder. (2)

3.3 A carport is to be put up along the main house.
Name FIVE hand tools necessary to execute the placing of concrete for the floor, assuming that the ground has been prepared and compacted. (5)

3.4 What determines the spacing of roof trusses? (1)

3.5 The ground is sloping where a building is to be erected.
Name a tool which is used to determine the slope of a ground. (1)

3.6 Draw a freehand sketch and in good ratio of a front view of a stretcher bond of four courses, show toothing on the left side and racking back on the right side. (6)

3.7 What is the general thickness of mortar between the bricks? (1)

3.8 Give ONE material used to reinforce brickwork. (1)

3.9 The archictect is busy designing a house. He chooses to use cavity wall construction for the outside walls.
Name FOUR advantages of cavity wall construction. (4)

3.10 Explaining the following brickwork terms:

3.10.1 Beam filling (2)

3.10.2 Lintel (2)

3.11 Name TWO reasons why the top soil must be removed before you start excavating the foundation. (2)
**[40]**

## QUESTION 4

4.1 Answer the folowing questions on the floor construction in figure 4.1.

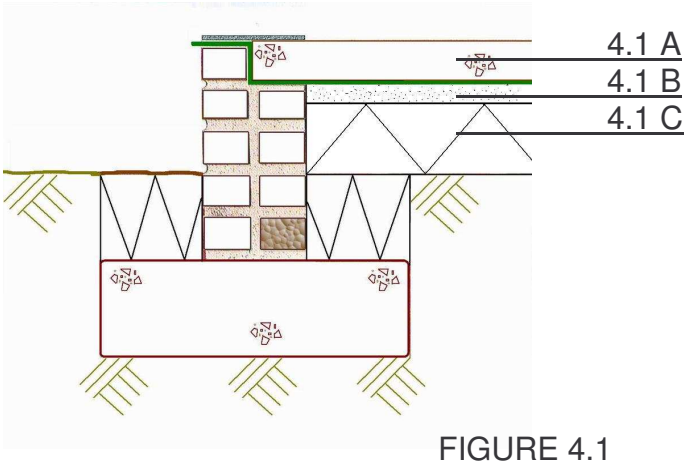


FIGURE 4.1

4.1.1 Name the parts 4.1 A to 4.1 C. (3)

4.1.2 What is the purpose of part 4.1 B? (1)

4.1.3 What is the thickness of part 4.1 B? (1)

4.2 Draw to a scale 1:10 the sectional view of a 300 mm x 300 mm square column with formwork.
Use the following detail:

- Concrete
- Formwork boards = 22 mm x 76 mm
- Bolts = 15 mm
- Yoke = 50 mm x 75 mm
- Clamp = 50 mm x 75 mm
- Wedge (14)

4.3 When formwork for concrete is being constructed, the workmen must ensure that it complies with standard building regulations.
Name any THREE requirements that the formwork must comply to. (3)

4.4 Name TWO types of scaffolding. (2)

4.5 You have registered your own building company. Your emloyees will need safety clothes before they can start to work.
Name FIVE types of protection clothing that you will provide. (5)

4.6 Name any FOUR safety rules which are applicable when working with machinery. (4)

4.7 Name any THREE safety rules applicable when using the angle grinder. (3)

4.8 People use stairs when moving to a higher level of the building. Which safety measure must be applied with regard to the following:

4.8.1 light (1)
4.8.2 obstacles (1)

4.9 Name TWO safety measures that should be applied when operating cranes. (2)

**[40]**

## QUESTION 5

5.1 When concrete is used on the building site, the workability is determined by the slump test.
Which material must be added when the sagging is too much? (1)

5.2 What is the purpose of the cube test? (1)

5.3 Identify four of the following requirements that are applicable to the cube test: (4)

5.3.1 The interior surfaces must be coated with mould oil

5.3.2 The concrete must be cast in 50 mm layers

5.3.3 Each layer must be compacted with a wooden rod

5.3.4 Each layer must be tromped 47 times for a 100 mm cube

5.3.5 The filling must be completed within 30 minutes after the concrete has been mixed

5.3.6 The cubes must be covered with plastic material

5.3.7 The cubes must be placed for 48 hours on a vibration free place

5.3.8 At least four cubes are required for each test

5.4 Roof trusses are frame structures which are designed to bear forces. To determine the size and type of material to be used effectively, the forces of each frame member must be determined.
Figure 5.4 on sheet C shows the loaded roof truss.
Answer the following questions on the roof truss on sheet C:

5.4.1 Determine graphically the nature and magnitude of each member by completing the force diagram. (6)

5.4.2 Complete the table by indicating the size and magnitude of each force. (7)

5.5 Figure 5.5 shows a loaded beam.
Determine the reaction forces of supports A and B. (8)

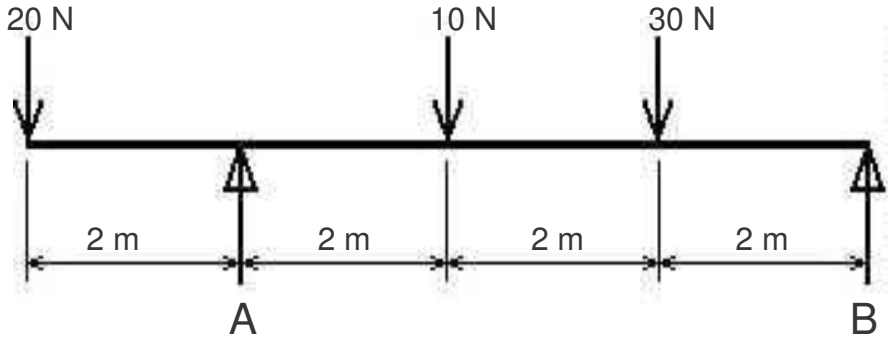


FIGURE 5.5

5.6 Figure 5.6 on sheet C shows a loaded concrete beam.
Use the information on sheet C to determine the following:

5.6.1 Determine the shearforces at points A to D (4)

5.6.2 Draw the shear force diagram according to the shear force values (5)

5.6.3 Determine the bending moments from points A to D (4)

**[40]**

**GRAND TOTAL: 200**