**CVLT**



# ISEBE LEMFUNDO LEMPUMA KOLONI

EASTERN CAPE EDUCATION DEPARTMENT

OOS-KAAP ONDERWYSDEPARTEMENT

IIMVIWO ZEBANGA LOKUGQIBELA

NATIONAL SENIOR CERTIFICATE EXAMINATIONS

NASIONALE SENIOR SERTIFIKAAT-EKSAMEN

### SEPTEMBER 2009

|  |
| --- |
| **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 question paper consists of 8 pages and a 4-page answer sheet.

|  |  |
| --- | --- |
| **REQUIREMENTS** |  |

|  |  |  |
| --- | --- | --- |
| 1.  2. | Drawing instruments  A non-programmable calculator |  |

|  |  |
| --- | --- |
| INSTRUCTIONS AND INFORMATION |  |

|  |  |  |
| --- | --- | --- |
| 1.  2.  3.  4.  5.  6.  7.  8.  9.  10.  11. | This question paper consists of FIVE questions.  ALL questions are COMPULSORY.  Answer each question as a whole. DO NOT separate sub-questions.  Start each question on a NEW page.  Sketches may be used to illustrate your answers.  ALL calculations and written answers must be done in the answer book.  Drawings and sketches must be fully dimensioned and neatly finished off with titles and labels to conform to SANS’ (SABS) Recommended Practice for Building Drawings.  For the purpose of this examination, the size of a brick should be taken as 220 mm x 110 mm x 75 mm.  Use your discretion where dimensions and/or details have been omitted.  Non-programmable pocket calculators may be used.  Answer QUESTION 4.1, QUESTION 4.2, QUESTION 4.4 and QUESTION 5.2 on answer sheets A to D. |  |

|  |  |
| --- | --- |
| **QUESTION 1** |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1.1 | Answer the following questions with regard to the joint below: | | |  |
|  |  |  | |  |
|  | 1.1.1 | What is the joint called? | | (1) |
|  |  |  | |  |
|  | 1.1.2 | Identify the parts 1.1 A and 1.1 B. | | (2) |
|  |  |  | |  |
|  | 1.1.3 | Where is this joint usually used? | | (2) |
|  |  | | 1.1 A 1.1 B |  |
| 1.2 | The height and placing of workspace and storage of kitchen cupboards are important. FIGURE 1.2 shows a kitchen cupboard construction. Identify parts A to E under the following headings: | | |  |
|  |  |  | |  |
|  |  | Comfortable height for use when standing | |  |
|  |  | Easy-access storage | |  |
|  |  | Seldom used storage | |  |
|  |  | Frequently used storage | | (5) |
|  | **1.2 A**  **1.2 B**  **1.2 C**  **1.2 D**  **1 2 E**  **FIGURE 1.2** | | |  |

|  |  |  |  |
| --- | --- | --- | --- |
| 1.3 | Name FOUR purposes of woodwork joints. | | (4) |
|  |  |  |  |
| 1.4 | Joints used in cabinet work may classified in FIVE main groups: | |  |
|  |  | |  |
|  |  | Widening joints |  |
|  |  | Lengthening joints |  |
|  |  | Corner joints |  |
|  |  | Housed joints |  |
|  |  | Framing joints |  |
|  |  |  |  |
|  | Identify each of the following joints as ONE of the above-mentioned main groups: | |  |
|  |  |  |  |
|  | 1.4.1 | Lapped dovetail joint | (1) |
|  |  |  |  |
|  | 1.4.2 | Corner bridle joint | (1) |
|  |  |  |  |
|  | 1.4.3 | Corner half-lapped joint | (1) |
|  |  |  |  |
|  | 1.4.4 | Mortise and tenon joint | (1) |
|  |  |  |  |
|  | 1.4.5 | Rubbed joint | (1) |
|  |  |  |  |
|  | 1.4.6 | Finger joint | (1) |
|  |  | |  |
| 1.5 | Name FOUR purposes of good occupational housekeeping. | | (4) |
|  |  |  |  |
| 1.6 | Describe the safety measure which is applicable to the following: | |  |
|  |  |  |  |
|  | 1.6.1 | Position of worker | (2) |
|  |  |  |  |
|  | 1.6.2 | Stairs | (2) |
|  |  |  |  |
|  | 1.6.3 | Power supply | (2) |
|  |  |  |  |
|  | 1.6.4 | Carrying tools with sharp ends | (2) |
|  |  |  |  |
|  | 1.6.5 | Height of a stack | (2) |
|  |  |  |  |
| 1.7 | Name TWO uses of each of the following tools: | |  |
|  |  | |  |
|  | 1.7.1 | Square nosed shovel | (2) |
|  |  |  |  |
|  | 1.7.2 | Flat steel square | (2) |
|  |  |  |  |
|  | 1.7.3 | Chalk line | (2) |
|  |  |  | **[40]** |

|  |  |
| --- | --- |
| **QUESTION 2** |  |

|  |  |  |  |
| --- | --- | --- | --- |
| 2.1 | A door opening of 1,2 m is to be finished off in a semi-circular arch with purpose made voussoirs. Draw to a scale 1:10 the front view of the single arch showing the surrounding brickwork in stretcher bond.  Name FIVE parts of the arch. | | (12) |
|  |  |  |  |
| 2.2 | Discuss the following requirements which are applicable to formwork to ensure its functionality: | |  |
|  |  |  | (2) |
|  | 2.2.1 | Strength |  |
|  |  |  |  |
|  | 2.2.2 | Joints | (2) |
|  |  |  |  |
| 2.3 | Wet concrete causes pressure in formwork. Name FOUR factors that influence the pressure of wet concrete in the formwork. | | (4) |
|  |  |  |  |
| 2.4 | Electricity can be generated by means of different methods. Name THREE of these methods and briefly explain each. | | (9) |
|  |  | |  |
| 2.5 | The isolation of conductors for domestic wiring has standard colours. Name the colours and explain each one. | | (6) |
|  |  | |  |
| 2.6 | Name FIVE advantages of plywood over sawn solid wood. | | (5) |
|  |  |  | **[40]** |

|  |  |
| --- | --- |
| QUESTION 3 |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | |  |
| 3.1 | You are looking for a suitable building site for a three-bedroom house. Name EIGHT factors which has to be considered when choosing a site. | | (8) |
|  |  |  |  |
| 3.2 | Explain the role of the architect in the building process. | | (2) |
|  |  |  |  |
| 3.3 | Name SIX more role-players in the building process. | | (6) |
|  |  |  |  |
| 3.4 | The FIGURE below show a S.A. type (Howe) roof truss.  Write down the letters A – E, and next to the letter the correct name of each member. | |  |
|  |  | | (5) |
|  |  | |  |
| 3.5 | Name FIVE other types of roof trusses which are commonly used for roof construction. | | (5) |
|  |  | |  |
| 3.6 | What factor determines the spacing between roof trusses? | | (1) |
|  |  | |  |
| 3.7 | What is the purpose of a grease trap and where will it be installed? | | (2) |
|  |  |  |  |
| 3.8 | Mankind is dependent on a supply of fresh water for survival. In the absence of piped water from the municipality, suggest TWO sources that supply fresh water that may be consumed by humans. | | (2) |
|  |  |  |  |
| 3.9 | Hot water systems: | |  |
|  |  |  |  |
|  | 3.9.1 | Name TWO advantages of a solar geyser. | (2) |
|  |  |  |  |
|  | 3.9.2 | Name TWO disadvantages of a solar geyser. | (2) |
|  |  |  |  |
| 3.10 | Briefly explain the purpose of a manhole and the advantage of installing one. | | (2) |
|  |  | |  |
| 3.11 | Name THREE methods to collect and remove sewage water in cases where no sewage treatment plant exists. | | (3) |
|  |  | | **[40]** |

|  |  |
| --- | --- |
| QUESTION 4 |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4.1 | FIGURE 4.1 show a symmetric body on axis XY. Determine the centre of gravity of the body on the centre line from X.  (The table on sheet A may be used for the calculations) | | |  |
|  | 3  1  2  2  4  X  2  2  4 8 2  **FIGURE 4.1** | | | (11) |
|  |  |  | |  |
| 4.2 | If any number of forces whose line of action meet at a point can be represented in magnitude and direction by the sides of a polygon, they are in equilibrium. FIGURE 4.2 on sheet A show a space diagram of four anchor cables keeping a mast post upright. | | |  |
|  |  |  |  |  |
|  | 4.2.1 | Complete the force diagram on sheet A and calculate the magnitude of forces X and Y. | | (9) |
|  |  |  |  |  |
|  | 4.2.2 | Determine the direction of forces X and Y and indicate it on the space diagram too. | | (1) |
|  |  |  |  |  |
| 4.3 | FIGURE 4.3 show a beam with point loads. Calculate the reaction forces of supports A and B. | | |  |
|  | 20 N 20 N 60 N    2 m 2 m 4 m  A B  **FIGURE 4.3** | | | (9) |
|  |  |  | |  |
| 4.4 | To determine the quantity and position of the steel reinforcement in a concrete beam, the moments caused by the loads must be calculated. FIGURE 4.4 on sheet B shows a diagrammatic representation of a beam with point loads. Calculate on sheet B the following: | | |  |
|  |  |  | |  |
|  | 4.4.1 | The bending moment values of points A to D. | | (6) |
|  |  |  | |  |
|  | 4.4.2 | Draw the bending moment diagram according to the given scale. | | (4) |
|  |  |  | | **[40]** |
|  |  |  | |  |
|  |  |  | |  |

|  |  |
| --- | --- |
| QUESTION 5 |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5.1 | A bar with a length of 3 meter and a radius of 5 mm extend 0,4 mm when a tensile force of 400 N is applied on it.  Calculate: (Show all formulas and calculations) | | |  |
|  |  | | |  |
|  | 5.1.1 | The stress | | (6) |
|  |  |  | |  |
|  | 5.1.2 | Strain | | (3) |
|  |  |  | |  |
|  | 5.1.3 | The elasticity | | (4) |
|  |  |  | |  |
| 5.2 | FIGURE 5.2 on sheet C show a planned extension to an existing building.  Answer the following questions with regard to the quantity list of the planned extension: | | |  |
|  |  |  | |  |
|  | 5.2.1 | Calculate on sheet C and D the number of bricks needed for the erecting of the super structure of the planned extension.  Wasting of 5% must be added. | | (15) |
|  |  |  |  |  |
|  | 5.2.2 | Briefly motivate why a contractor needs a quantity list to tender for a project. | | (2) |
|  |  |  | |  |
| 5.3 | Identify FOUR of the particulars below that are applicable to section elevations: | | | (4) |
|  |  | | |  |
|  | 5.3.1 | The width and thickness of foundations | |  |
|  |  |  | |  |
|  | 5.3.2 | The roof construction | |  |
|  |  |  | |  |
|  | 5.3.3 | Access to the site | |  |
|  |  |  | |  |
|  | 5.3.4 | Number of the site | |  |
|  |  |  | |  |
|  | 5.3.5 | Position of damp proofing | |  |
|  |  |  | |  |
|  | 5.3.6 | Ceilings and brandering | |  |
|  |  |  | |  |
|  | 5.3.7 | Building lines | |  |
|  |  |  | |  |
|  | 5.3.8 | North arrow | |  |
|  |  |  | |  |
| 5.4 | Make neat sketches to illustrate the following symbols: | | |  |
|  |  |  | |  |
|  | 5.4.1 | Water meter | | (2) |
|  |  |  | |  |
|  | 5.4.2 | Manhole | | (2) |
|  |  |  | |  |
|  | 5.4.3 | Shower | | (2) |
|  |  |  | | **[40]** |

|  |  |  |
| --- | --- | --- |
|  |  | **TOTAL:** **200** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ANTWOORDBLAD**  **ANSWER SHEET** | **A** | **SIVIELE TEGNOLOGIE**  **CIVIL TECHNOLOGY** | **NAAM:**  **NAME:** |  |
|  |

**VRAAG/QUESTION 4.1** (11)

|  |  |  |  |
| --- | --- | --- | --- |
| Vorm/Shape | Area | X | m X |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| TOTAAL/TOTAL |  |  |  |
| Swaartepunt/Centre of gravity = …………………………………… | | | |

**FIGURE/FIGURE 4.2** (10)

RUIMTEDIAGRAM KRAGTEDIAGRAM

SPACE DIAGRAM FORCE DIAGRAM

**SKAAL/SCALE: 1 mm = 1N**

**60 N**

**A**

**Y**

**50 N**

**a**

**X**

**X = ………………….. Y = ……………………….**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ANTWOORDBLAD**  **ANSWER SHEET** | **B** | **SIVIELE TEGNOLOGIE**  **CIVIL TECHNOLOGY** | **NAAM:**  **NAME:** |  |
|  |

**FIGURE/FIGUUR 4.4**

|  |  |  |
| --- | --- | --- |
| 4.4.1 | Die buigmomentwaardes/The bending moment values | (6) |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | a **= …………………………………………………..** |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | b **= …………………………………………………..** |  |

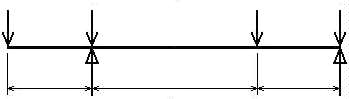
|  |  |  |  |
| --- | --- | --- | --- |
|  |  | c **= …………………………………………………..** |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | d **= …………………………………………………..** |  |

|  |  |  |
| --- | --- | --- |
| 4.4.2 | Die buigmomentdiagram/The bending moment diagram | (4) |

SCALE/SKAAL: 2 mm = 1 N

10 N 40 N 20 N 30 N



**2 m 4 m 2 m**

**60 N 40 N**



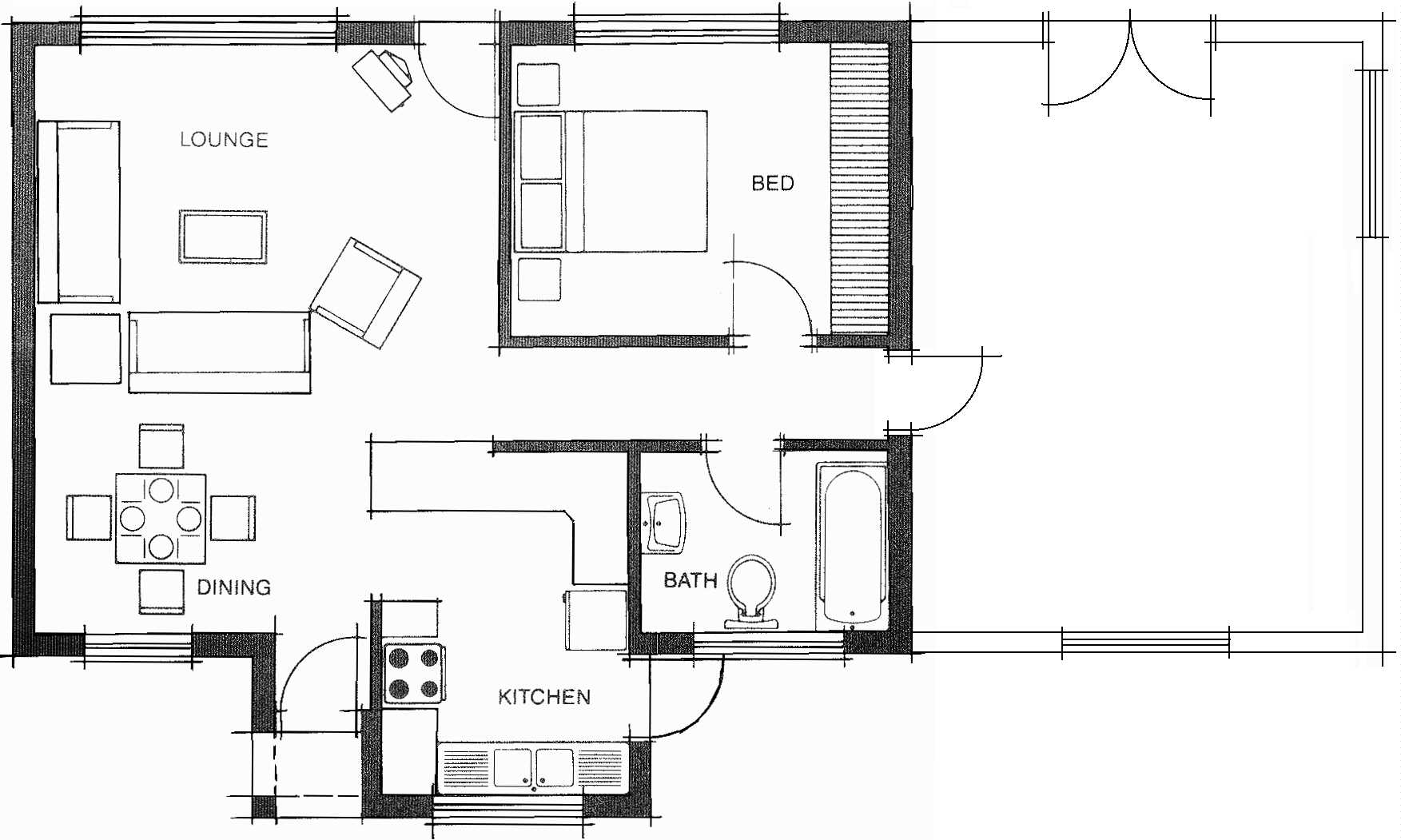
**a b c d**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ANTWOORDBLAD**  **ANSWER SHEET** | **C** | **SIVIELE TEGNOLOGIE**  **CIVIL TECHNOLOGY** | **NAAM:**  **NAME:** |  |
|  |

**5 000**

**FIGURE/FIGURE 5.2.1** (15)

**4 720 280**



**Muurhoogte/Wall height: 2,6 m D1 = 2 100 x 900**

**50 Stene/m² vir halfsteenmuur D2 = 2 100 x 1 800**

50 Bricks/m² for half brick wall V1 = 1 200 x 2 400

|  |  |  |  |
| --- | --- | --- | --- |
| **A** | **B** | **C** | **D** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ANTWOORDBLAD**  **ANSWER SHEET** | **D** | **SIVIELE TEGNOLOGIE**  **CIVIL TECHNOLOGY** | **NAAM:**  **NAME:** |  |
|  |

|  |  |  |  |
| --- | --- | --- | --- |
| **A** | **B** | **C** | **D** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |