

Province of the

**EASTERN CAPE**

EDUCATION

**NATIONAL**

**SENIOR CERTIFICATE**

**GRADE 11**

**NOVEMBER 2010**

|  |
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| **CIVIL TECHNOLOGY** |

**MARKS: 200**

**TIME: 3 hours**

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| This question paper consists of 10 pages and 3 pages of answer sheet. |

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| **REQUIREMENTS:** | |  |
|  |  |  |
| 1. | Drawing instruments |  |
|  |  |  |
| 2. | A non-programmable calculator |  |
|  |  |  |
| **INSTRUCTIONS AND INFORMATION** | |  |
|  |  |  |
| 1. | This question paper consists of FIVE questions. |  |
|  |  |  |
| 2. | ALL questions are COMPULSORY. |  |
|  |  |  |
| 3. | Answer each question as a whole, DO NOT separate sub-questions. |  |
|  |  |  |
| 4. | Start each question on a NEW page. |  |
|  |  |  |
| 5. | Sketches may be used to illustrate your answers. |  |
|  |  |  |
| 6. | ALL calculations and written answers must be done in the answer book. |  |
|  |  |  |
| 7. | 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. |  |
|  |  |  |
| 8. | For the purpose of this examination, the size of a brick should be taken as 220 mm x 110 mm x 75 mm. |  |
|  |  |  |
| 9. | Use your discretion where dimensions and/or details have been omitted. |  |
|  |  |  |
| 10 | Non-programmable pocket calculators may be used. |  |
|  |  |  |
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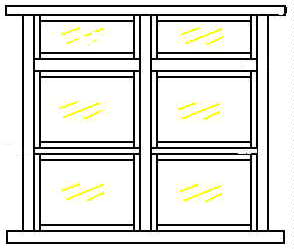
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| **QUESTION 1** | | |  |
|  | | |  |
| 1.1 | You are on a building site responsible for the general safety measures for the machines. Describe FIVE machine safety measures which must be considered by workers to work safely. (5x2) | | (10) |
|  |  | |  |
| 1.2 | Answer the following questions with regard to the safety of trenches: | |  |
|  |  | |  |
|  | 1.2.1 | Which method must be used to get access to a deep trench? | (1) |
|  |  |  |  |
|  | 1.2.2 | When must the sides of a trench be braced? | (1) |
|  |  |  |  |
| 1.3 | Identify FOUR of the following safety measures which are applicable to scaffolds: | | (4) |
|  |  |  |  |
|  | 1.3.1 | Poles which are not straight, must be repaired |  |
|  |  |  |  |
|  | 1.3.2 | Poles must be straight |  |
|  |  |  |  |
|  | 1.3.3 | Scaffolds must be tied to the building at 20 meter intervals |  |
|  |  |  |  |
|  | 1.3.4 | Scaffolds must be tied to the building at 15 meter intervals |  |
|  |  |  |  |
|  | 1.3.5 | Independent scaffolding must have alternate diagonal braces |  |
|  |  |  |  |
|  | 1.3.6 | The span between standards must not be less than 2,4 m |  |
|  |  |  |  |
|  | 1.3.7 | Only trained people should erect scaffolds |  |
|  |  |  |  |
|  | 1.3.8 | Scaffolds on hard soil do not need base plates |  |
|  |  |  |  |
| 1.4 | Name FOUR causes of fires in the building environment. | | (4) |
|  |  |  |  |
| 1.5 | Which type of material will you use for hot water pipes in a house? Motivate your answer by referring to at least TWO properties of the material. | | (3) |
|  |  |  |  |
| 1.6 | Briefly motivate why armoured glass is used for shop windows by referring to at least THREE properties of armoured glass. | | (3) |
|  |  |  |  |
| 1.7 | Name TWO advantages of concrete hollow bricks. | | (2) |
|  |  |  |  |
| 1.8 | Name FOUR properties of aluminium. | | (4) |

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| 1.9 | Identify the following description as TRUE or VALSE: | | | | |  |
|  |  |  | | | |  |
|  | 1.9.1 | Mild steel is a ferrous metal | | | |  |
|  |  |  | | | |  |
|  | 1.9.2 | Mild steel is easy to be drilled and sawn | | | |  |
|  |  |  | | | |  |
|  | 1.9.3 | Mild steel is dipped in molten zinc | | | |  |
|  |  |  | | | |  |
|  | 1.9.4 | Galvanized sheet metal rust easily | | | |  |
|  |  |  | | | |  |
|  | 1.9.5 | Stainless steel is corrosive resistant because it is mixed is mixed with chrome | | | |  |
|  |  |  | | | |  |
|  | 1.9.6 | Stainless steel is durable | | | |  |
|  |  |  | | | |  |
|  | 1.9.7 | Cast iron is hard and brittle | | | |  |
|  |  |  | | | |  |
|  | 1.9.8 | Brass corrode easily | | | | (8) |
|  |  |  | | | | **[40]** |
| **QUESTION 2** | | | | | |  |
|  |  |  | | | |  |
| 2.1 | Identify the tools in FIGURES 2.1.1 to 2.1.6 and name ONE use of each: | | | | | (12) |
|  |  |  |  |  |  |  |
|  | 2.1.1 |  | | 2.1.2 |  |  |
|  |  |  |  |  |  |  |
|  | 2.1.3 |  | | 2.1.4 |  |  |
|  |  |  |  |  |  |  |
|  | 2.1.5 |  | | 2.1.6 |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 2.2 | Why must steel tools periodically be oiled? | | | (1) |
|  |  | | |  |
| 2.3 | What is the cutting direction of the teeth of the portable jig-saw? | | | (1) |
|  |  | | |  |
| 2.4 | What is the cutting direction of the teeth of the band saw? | | | (1) |
|  |  | | |  |
| 2.5 | Name FIVE safety measures which must be applied when the band saw is used. | | | (5) |
|  |  | | |  |
| 2.6 | Answer the following questions with regard to the floor plan of the bathroom in FIGURE 2.6 on SHEET A. | | |  |
|  | Complete the floor plan by drawing in the following symbols on scale 1:50; | | |  |
|  |  | | |  |
|  | 2.6.1 | | Door at 2.6 A | (2) |
|  |  | |  |  |
|  | 2.6.2 | | Window at by 2.6 B | (3) |
|  |  | |  |  |
|  | 2.6.3 | | Shower at 2.6 C | (2) |
|  |  | |  |  |
|  | 2.6.4 | | Toilet by 2.6.D | (2) |
|  |  | |  |  |
|  | 2.6.5 | | Gully and abbreviation at 2.6 E | (2) |
|  |  | |  |  |
|  | 2.6.6 | | Rodding eye and abbreviation at 2.6 F | (2) |
|  |  | |  |  |
|  | Answer the following questions with regard to the floor plan in FIGURE 2.6 on SHEET A. | | |  |
|  |  | | |  |
|  | 2.6.7 | What is the TABLE 2.6 G on the drawing sheet called? | | (1) |
|  |  |  | |  |
|  | 2.6.8 | What is the TABLE 2.6 H on the drawing sheet called? | | (1) |
|  |  |  | |  |
|  | 2.6.9 | Use the information on SHEET A and do the measurement writing of the west elevation according to standard building drawing practice. | | (5) |
|  |  |  | | **[40]** |

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| **QUESTION 3** | | |  |
|  |  | |  |
| 3.1 | Name FIVE requirements to which a brick wall must comply. | | (5) |
|  |  | |  |
| 3.2 | What is the purpose of a tingle when brickwork is done? | | (1) |
|  |  | |  |
| 3.3 | What is the average thickness of mortar joints in brickwork? | | (1) |
|  |  | |  |
| 3.4 | Complete the following description of brick reinforcement: | |  |
|  |  | |  |
|  | Cracks may occur in brickwork, but can be controlled using …3.4.1... in the ...3.4.2... between the layers of brick.  A wire net of ...3.4.3... steel, called brick force, should be placed between every ...3.4.4... brick course to help strengthen the walls. | | (4) |
|  |  | |  |
| 3.5 | What is the purpose of wall plates on the outer walls? | | (2) |
|  |  | |  |
| 3.6 | Fully describe what beam filling is. | | (3) |
|  |  | |  |
| 3.7 | What is the purpose of the cavity opening in a cavity wall? | | (1) |
|  |  | |  |
| 3.8 | What is the standard wall thickness of a cavity wall? | | (1) |
|  |  | |  |
| 3.9 | Briefly motivate why the construction of a cavity wall is more expensive than the construction of a single brick wall. | | (3) |
|  |  | |  |
|  | Describe the manufacturing process of a pre-stressed concrete lintel. | | (3) |
|  |  | |  |
| 3.10 | | Identify the parts of the casement timber window frame in FIGURE 3.10. | (6) |

3.10.1



3.10.2

3.10.5

3.10.3

3.10.4

3.10.6

**FIGURE 3.10**

|  |  |  |
| --- | --- | --- |
| 3.11 | What are the standard width and thickness measurements of a timber door frame? | (2) |
|  |  |  |
| 3.12 | FIGURE 3.12 shows the sectional view of a hallow care flush door. Name the parts 3.12.1 to 3.12.4. | (4) |

3.12.1

3.12.2

3.12.3

3.12.4

**FIGUUR 3.12**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | |  |
| 3.13 | Where will you find the following moulded components: | | |  |
|  |  | | |  |
|  | 3.13.1 | | Dado rail | (1) |
|  |  | |  |  |
|  | 3.13.2 | | Architrave | (1) |
|  |  | |  |  |
|  | 3.13.3 | | Cornice | (1) |
|  |  | |  |  |
|  | 3.13.4 | | Half round | (1) |
|  |  | |  | **[40]** |
|  |  | | |  |
| **QUESTION 4** | | | |  |
|  |  | | |  |
| 4.1 | A bar with a length of 4.5 m and a radius of 4 mm, lengthens by 0,3 mm when subjected to a force of 600 N. | | |  |
|  |  | | |  |
|  | Calculate: **(Show all formulae and calculations)** | | |  |
|  |  | | |  |
|  | 4.1.1 | the stress | | (6) |
|  |  |  | |  |
|  | 4.1.2 | the strain | | (3) |
|  |  |  | |  |
|  | 4.1.3 | the elasticity | | (3) |
|  |  | | |  |
| 4.2 | Use the information on answer SHEET A and calculate on answer SHEET A, by completing the table, the centroid of FIGURE 4.2.  Calculate the centroid from point P and show all calculations and formula. | | | (10) |

|  |  |  |  |
| --- | --- | --- | --- |
| 4.3 | Calculate the reaction forces in the supports A and B in the beam in the FIGURE 4.3 below. | | (8) |
|  | 15 N 10 N 30 N 15 N  2 m 4 m 2 m  **A B**  **FIGURE 4.3** | |  |
|  |  | |  |
| 4.4 | FIGURE 4.4 on answer SHEET C shows the space diagram of a frame structure. Construct the force diagram to scale on answer SHEET C and calculate the sizes and nature of the forces in the parts of the structure. | | (10) |
|  |  | | **[40]** |
|  |  | |  |
| **QUESTION 5** | | |  |
|  |  | |  |
| 5.1 | Wood must be treated with preservatives to prevent rotting. You have a choice between coal tar creosote an a preservative with a water-soluble base to treat interior wood. | |  |
|  |  | |  |
|  | 5.1.1 | Which of the above mentioned preservative would you use? | (1) |
|  |  |  |  |
|  | 5.1.2 | Motivate your choice by referring to FIVE properties of the chosen preservative. | (5) |
|  |  | |  |
| 5.2 | Identify the following descriptions of the empty cell preservative application process as TRUE or FALSE: | | (3) |
|  |  | |  |
|  | 5.2.1 | It is done with wood that easily absorbs preservatives; |  |
|  |  |  |  |
|  | 5.2.2 | In this method the wood cells are washed out with the preservatives; |  |
|  |  |  |  |
|  | 5.2.3 | With this method the wood is placed in an open chamber. |  |

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| 5.3 | Describe the following properties of corrugated iron roof sheets: | |  |
|  |  | |  |
|  | 5.3.1 | Costs | (1) |
|  |  |  |  |
|  | 5.3.2 | Weight | (1) |
|  |  |  |  |
|  | 5.3.3 | Insulation | (2) |
|  |  |  |  |
|  | 5.3.4 | Corrosion | (2) |
|  |  |  |  |
| 5.4 | Identify the correct requirement that is applicable to concrete roof tiles: | |  |
|  |  | |  |
|  | 5.4.1 | Tile measurements are **±420 x 330 mm/1 200 x 330 mm** | (1) |
|  |  |  |  |
|  | 5.4.2 | The tiles hook on the **rafters/battens** to prevent it from sliding down | (1) |
|  |  |  |  |
|  | 5.4.3 | The costs of the tiles is **expansive/cheap** | (1) |
|  |  |  |  |
|  | 5.4.4 | Maintenance cost is **low/high** | (1) |
|  |  | |  |
| 5.5 | Why must the foot batten for tiles be larger than the other battens? | | (2) |
|  |  | |  |
| 5.6 | Name FOUR factors which must be considered when timbering for temporary supports are designed. | | (4) |
|  |  | |  |
| 5.7 | Identify the correct plumbing regulation in the following descriptions: | |  |
|  |  | |  |
|  | 5.7.1 | The high-pressure geyser is used when the water pressure **vary/is constant** | (1) |
|  |  |  |  |
|  | 5.7.2 | Water pressure is controlled by **valves/taps** | (1) |
|  |  |  |  |
|  | 5.7.3 | Incoming water must loop at least **100 mm/200 mm** above the geyser | (1) |
|  |  |  |  |
|  | 5.7.4 | Vacuum breakers must be at least **200 mm/300 mm** above the highest inflow of the water to the system | (1) |
|  |  |  |  |
|  | 5.7.5 | The purpose of the safety valve is to controls the **inner pressure/heat** of the geyser | (1) |
|  |  | |  |
| 5.8 | Make a neat sketch of a P-trap. | | (2) |
|  |  | |  |
| 5.9 | Name THREE positions in a drain system where access openings must be provided. | | (3) |
|  |  | |  |
| 5.10 | Name ONE purpose of the air pipe in a drain system. | | (1) |

|  |  |  |
| --- | --- | --- |
| 5.11 | The table below shows an extraction from a quantity list. Identify tables A to D. | (4) |
|  | |  |  |  |  | | --- | --- | --- | --- | | **A** | **B** | **C** | **D** | |  |  |  | Centre line:6 440+5 440+6 440+5 440–(220x4) | |  |  |  | Thus: Wall length = 22 880m | | 1/ | 22,88 |  |  | |  | 2,4 | 54.912 | Thus: Wall area = 54,912 m2 | |  |  |  |  | |  | 54,912 |  | 100 bricks/m2 | |  | 100 | 5 491,2 | Total bricks=5 492 /for building | |  |  |  | . | |  |
|  |  | **[40]** |
|  |  |  |
|  | **TOTAL:** | **200** |