

Province of the

**EASTERN CAPE**

EDUCATION

**NATIONAL**

**SENIOR CERTIFICATE**

**GRADE 11**

**NOVEMBER 2010**

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| **CIVIL TECHNOLOGY**  **MEMORANDUM** |

**MARKS: 200**

**TIME: 3 hours**

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| This memorandum consists of 10 pages. |

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| **QUESTION 1** | | | | | |  |
|  | | | | | |  |
| 1.1 | * Not working without authorization * Only work with machines when conversant with safety rules * One operator at a time * Concentrate on point of action * Not adjust whilst machine is in motion * Machine guards in good condition * Even pressure to blades * Adequate lighting * Adhere manufacturer’s manual * Hands away from revolving blades * Protective clothing * Electric cables checked * Safety rules displayed * Machines and surrounding clean | | | | | (10) |
|  |  | | | | |  |
| 1.2 | 1.2.1 | Ladder | | | | (1) |
|  | 1.2.2 | Deeper than 1,5 m | | | | (1) |
|  |  |  | | | |  |
| 1.3 | 1.3.1 | Poles which are not straight, must be repaired | | | | (4) |
|  | 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. | | | | |  |
|  | - Faulty electricity  - Open flames  - Heated surfaces  - Spontaneous ignition  - Chemical reaction  - Static electricity  - Friction  - Lightning | | | | | (4) |
|  |  | | | | |  |
| 1.5 | Copper  Any TWO properties  - Do not rust  - Resistance to oxidation  - Good malleable property | | | | | (3) |
|  |  |  | | | |  |
| 1.6 | Any THREE properties of armoured glass  - 5 times stronger than ordinary glass  - Disintegrates into small cubes that minimize injuries | | | | | (3) |
|  |  |  | | | |  |
| 1.7 | Any TWO advantages of concrete hollow bricks  - Cheaper  - Faster to build with  - Different strengths/sizes | | | | | (2) |
|  |  |  | | | |  |
| 1.8 | Any FOUR properties of aluminium  - Light  - Silvery in colour  - Ductile  - Malleable  - Resistance to corrosion  - Easy to cut / drill  - Conduct electricity / heat | | | | | (4) |
|  |  | | | | |  |
| 1.9 | Identify the following description as TRUE or FALSE: | | | | |  |
|  | 1.9.1 | TRUE | | | | (1) |
|  | 1.9.2 | TRUE | | | | (1) |
|  | 1.9.3 | FALSE | | | | (1) |
|  | 1.9.4 | FALSE | | | | (1) |
|  | 1.9.5 | TRUE | | | | (1) |
|  | 1.9.6 | TRUE | | | | (1) |
|  | 1.9.7 | TRUE | | | | (1) |
|  | 1.9.8 | VALSE | | | | (1) |
|  |  |  | | | | **[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 | Level  - Test surface for horizontal /   vertical  - Use as a straight edge | | 2.1.2 | Plaster trowel  - Smear plaster onto wall |  |
|  | 2.1.3 | Portable belt sander  - Rough sanding | | 2.1.4 | Portable electric planer  - Plane wood/edges/chamfer  /etc. |  |
|  | 2.1.5 | Circular saw  - Saw wood/with or against  grain  - Rebates  - Mitres  - At angle | | 2.1.6 | Radial arm saw  - Cross cutting  - Rip  - Metre  - At angle |  |
|  |  |  | |  |  |  |
| 2.2 | Prevent rust | | | | | (1) |
| 2.3 | Upwards | | | | | (1) |
| 2.4 | Downwards | | | | | (1) |
|  |  | | | | |  |

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| 2.5 | Any FIVE safety measures for the band saw  - Stand in front of blade  - ands away from line of cut  - Blunt blades replace  - Not the work force  - Blade guides in position  - Not backing out in the cut  - Correct blade tension  - Correct blade alignment  - Plan cuts | | | (5) |
|  |  | | |  |
| 2.6 | 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]** |
|  |  |  | |  |
| **QUESTION 3** | | | |  |
|  |  | | |  |
| 3.1 | Any FIVE requirements to which a brick wall must comply.  - Resistance to loads from floor to roof  - Insulation to rain - Insulation to heat  - Insulation to cold - Insulation to noise  - Security - Stability in fire  - Minimum openings for ventilation - Minimum openings for light | | | (5) |
|  |  | | |  |
| 3.2 | Keep building lines straight | | | (1) |
|  |  | | |  |
| 3.3 | 10 mm | | | (1) |
|  |  | | |  |
| 3.4 | 3.4.1 - Reinforcement 3.4.2 - Bed joint  3.4.3 - Galvanised 3.4.4 - 4th | | | (4) |
|  |  | | |  |
| 3.5 | (1) Spread loads/ forces (2) evenly on brick wall  - Prevent trusses to damage brickwork/wrapping loose | | | (2) |
|  |  | | |  |
| 3.6 | (1) Gap between top of wall and (2) roof covering (3) built up / filled | | | (3) |
|  |  | | |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 3.7 | Insulation | | |  | |
|  |  | | |  | |
| 3.8 | 270 mm (280) | | |  | |
|  |  | | |  | |
| 3.9 | (1) High standard of workmanship (2) constant supervision (3) more labour intensive | | |  | |
|  |  | | |  | |
| 3.9 | (1) Steel wires pre-tensioned (2) concrete is cast (3) wires are released | | |  | |
|  |  | | |  | |
| 3.10 | 3.10.1 | | Frame head |  | |
|  | 3.10.2 | | Frame stile |  | |
|  | 3.10.3 | | Sash stile |  | |
|  | 3.10.4 | | Muntin |  | |
|  | 3.10.5 | | Sash rail |  | |
|  | 3.10.6 | | Window sill |  | |
|  |  | |  |  | |
| 3.11 | 114x75 mm | | | (2) | |
|  |  | | |  | |
| 3.12 | 3.12.1 | | Plywood |  | |
|  | 3.12.2 | | Lock block |  | |
|  | 3.12.3 | | Frame |  | |
|  | 3.12.4 | | Edge strip | (4) | |
|  |  | | |  | |
| 3.13 | 3.13.1 | | Dado rail – Against wall to protect against furniture damage | (1) | |
|  | 3.13.2 | | Architrave –Between wall and timber door frame | (1) | |
|  | 3.13.3 | | Cornice – Between ceiling and wall | (1) | |
|  | 3.13.4 | | Half round – Open joints | (1) | |
|  |  | |  | **[40]** | |
|  |  | | |  | |
| **QUESTION 4** | | | |  | |
|  |  | | |  | |
| 4.1 | 4.1.1 | the stress | | (6) | |
|  |  | A = r² =  (0,004²) = 0,000 050 3 m² | |  | |
|  |  |  | |  | |
|  |  |  = F = 600 = 11 936 620,73 Pa | |  | |
|  |  | A 0,000 050 3 | |  | |
|  |  |  | |  | |
|  | 4.1.2 | the strain | |  | |
|  |  | ∈ = x = 0,000 3 = 0,000 067 | |  | |
|  |  | Lo 4,5 | | (3) | |
|  |  |  | |  | |
|  | 4.1.3 | the elasticity | | |  |
|  |  | E =  = 11 936 620,73 Pa = 1,7911 Pa | | |  |
|  |  |  0,000 067 | | | (3) |
|  |  | | | |  |

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| 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 supports A and B in the beam in FIGURE 4.3. | | | | (8) |
|  |  | | | |  |
|  | Around A | | | Around B |  |
|  | L.O.M. = R.O.M | | | R.O.M. = L.O.M. |  |
|  | (Bx6)+(15x2) = (30x4)+(15x6) | | | (Ax6) = (30x2)+(10x6)+(15x8) |  |
|  | B6 + 30 = 120 + 90 | | | A6 = 60 + 60 + 120 |  |
|  | B = 210 - 30 | | | A = 240 |  |
|  | = 180 | | | 6 |  |
|  | 6 | | | = 40 N |  |
|  | = 30 N | | |  |  |
|  |  | | | |  |
| 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 | 5.1.1 | | preservative with a water-soluble base | | (1) |
|  |  | |  | |  |
|  | 5.1.2 | | Any FIVE properties of the chosen preservative.  - Colourless - Odourless  - Wood be painted / glued afterwards - Not inflammable  - Not poisonous for humans - Salts may leach out  - May cause metals to corrode - May change dimensions | | (5) |
|  |  | | | |  |
| 5.2 | 5.2.1 | | TRUE | |  |
|  | 5.2.2 | | TRUE | |  |
|  | 5.2.3 | | FALSE | | (3) |
|  |  | | | |  |
| 5.3 | 5.3.1 | | Costs - Cheaper | | (1) |
|  | 5.3.2 | | Weight – Light in weight | | (1) |
|  | 5.3.3 | | Insulation – (1) Good conductivity gives (2) weak insulation | | (2) |
|  | 5.3.4 | | Corrosion – (1) Near see / damaged parts (2) corrosion developed | | (2) |
|  |  | | | |  |
| 5.4 | 5.4.1 | | **±420 x 330 mm** | | (1) |
|  | 5.4.2 | | **battens** | | (1) |
|  | 5.4.3 | | **expansive** | | (1) |
|  | 5.4.4 | | **low** | | (1) |
|  |  | |  | |  |
| 5.5 | (1) Avoid last row of tiles slopes (2) not more than counterparts | | | | (2) |
|  |  | | | |  |

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| 5.6 | Any FOUR factors when timbering for temporary supports are designed.  - Nature of soil - Depth of excavation  - Weather conditions - Duration of project  - Soil water - Available material  - Costs - Preference | | (4) |
|  |  | |  |
| 5.7 | 5.7.1 | **vary** | (1) |
|  | 5.7.2 | **valves** | (1) |
|  | 5.7.3 | **200 mm** | (1) |
|  | 5.7.4 | **300 mm** | (1) |
|  | 5.7.5 | **inner pressure** | (1) |
|  |  | |  |
| 5.8 | P-trap | | (2) |
|  |  | |  |
| 5.9 | Any THREE positions where access openings must be provided.  - Change in direction - Pipes connected - Each 25 m  - 1,5 m from site boundary - Beginning of drain system | | (3) |
|  |  | |  |
| 5.10 | Any ONE purpose of the air pipe in a drain system  - Foul air out of system - Prevent sucking/pressure in system | | (1) |
|  |  | |  |
| 5.11 | A - Multiplication column B - Measurement column  C - Result column D - Description column | | (4) |
|  |  | | **[40]** |
|  |  | |  |
|  | **TOTAL:** | | **200** |

|  |  |  |
| --- | --- | --- |
| ANSWER SHEET A QUESTION 2.6 (20)NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ GRADE: 11 \_\_\_\_\_\_ 2.6 F  2.6 E    IE/SO  G/RP  2.6 B  280  2.6.G  1700  2100  2.6.D  2.6 C  120  2.6 A  BATHROOM FLOORPLAN    SCALE 1:50  BATHROOM INNER MEASUREMENTS: 3 m x 1,7 m  OUTER WALL THICKNESS: 280 mm  2.6.H  INNER WALL THICKNESS: 120 mm | | |
|  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ANSWER SHEET B QUESTION 4.2 (10) **NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ GRADE: 11 \_\_\_\_\_\_**  Y-as / axis  **B**  3    **A**  6  X-as / axis  **P**  3  3   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Shape** | **Area** | **X** | **AX** | **Y** | **AY** | | **A** | **lxb**  **6x6**  **= 36**  **(1)** | **b 6**  **2 = 2**  **= 3**  **(½)** | **108**  **(½)** | **h 6**  **2 = 2**  **= 3**  **(½)** | **= 108**  **(½)** | | **B** | **½bh**  **½3x3**  **= 4.5**  **(1)** | **b 3**  **3 = 3**  **= 1 + 3 = 4**  **(½)** | **18**    **(½)** | **h 3**  **3 = 3**  **= 1 + 6 = 7**  **(½)** | **= 31.5**  **(½)** | | **Totaal** | **40.5 (1)** |  | **126**  **(½)** |  | **139.5**  **(½)** |   **126 3.11 139.5 3,44**  **X = (½) = ………….(½) Y = (½) = ………….(½)**  **40.5 40.5** |
| ANSWER SHEET C QUESTION 4.4 (10) a  **NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ GRADE: 11 \_\_\_\_\_\_**  40N    C D  30 N 30 N    (12÷2) 6  B I J E  10 N H K 10 N  A F  G  60 N 60 N  j  k  g  h  Kragte diagram/Force diagram  d  Skaal/Scale: 1mm = 1N  i   | Deel  Part | Grootte  Size | Stut/Strut | Stang/Tie | | --- | --- | --- | --- | | BH | 98 N |  |  | | CI | 69 N |  |  | | DJ | 69 N | **X** |  | | EK | 98 N | **X** |  | | GH | 84 N |  | **X** | | GK | 84 N |  | **X** | | HI | 29 N | **X** |  | | IJ | 31 N |  | **X** | | JK | 29 N | **X** |  |   b  c  (8÷2) 4  f  e |