This memorandum consists of 16 pages.
QUESTION 1: CONSTRUCTION, SAFETY AND MATERIAL

1.1 1.1.1 • The person is using a table and chairs to reach the required height. ✓
• The person is not using the appropriate safety equipment. (1)

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

1.1.2 The person can use a ladder or scaffolding to reach the required height. ✓ (1)

1.2 1.2.1 • When using a grinder the sparks can burn your face. ✓
• When using a grinder the sparks can damage your eyes.
• When painting the paint can splash in your eyes.
• When cutting or chiselling wood the wood splinters can get into your face. (1)

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

1.2.2 • When working with cement you will inhale the dust and it can cause lung problems. ✓
• When sawing/sanding wood you will inhale the dust. (1)

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

1.2.3 • You can get an injury when heavy objects fall on your feet. ✓
• You can get an injury when stepping onto nails, screws or any other sharp object.
• You won't have the insulation protection when coming in contact with electricity. (1)

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

1.3 • Ensure that workers maintain a safe distance from material that is moving overhead ✓
• Seek help to move material that is too heavy to handle alone. ✓
• Ensure that there are enough workmen to carry heavy loads. ✓
• The material must be secured firmly.
• When material is being moved by a hoist a qualified person must operate the hoist. (3)

ANY THREE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER
1.4

- Quarter round/
  - Skirting

1.5

1.5.1

- Channel-iron

1.5.2

- The steel profile is grey
- Prone to rust
- A good conductor of heat
- Malleable
- Doesn't bend easily
- Welds well
- Can easily be joined

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

1.6

- Stone is used to add bulk to the concrete.
- Stone makes the mix more economical.
- Using stone in concrete reduces the paste content and therefore makes the concrete more stable.
- The quantity of stone also determines the strength of the concrete.
- Stone also reduces shrinkage and deformations.

ANY THREE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

1.7

- Beneath concrete floors.
- Under window sills.
- At roofs/under roof covering.
- Under the wall of the super structure.

ANY THREE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

1.8

Damp proof course is used to prevent damp/moisture to enter a building.

1.9

1.9.1

- Stretcher bond

1.9.2

END VIEW
1.9.3

<table>
<thead>
<tr>
<th>ASSESSMENT CRITERIA</th>
<th>MARK</th>
<th>CANDIDATE'S MARK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stretcher course of main wall</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Stretcher course of T-junction</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

1.10
- Clay/Slate tiles √
- Galvanised corrugated iron sheets √
- Galvanised IBR roof sheeting
- Thatch roof
- Cement fibre sheet

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

1.11
- Timber frames need regular maintenance. √
- Timber is expensive since imported hardwood is scarce. √
- Timber cannot be effectively burglar-proofed.
- Timber is prone to attacks by insects and fungi.
- Timber is not fire resistant.

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

[30]
QUESTION 2: ADVANCED CONSTRUCTION AND EQUIPMENT

2.1 Portable electric planer ✓

2.1.2 This machine is mainly used to plane:
- edges. ✓
- ends. ✓
- bevels.
- rebates.
- chamfers.

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

2.1.3
- It can remove more than 2 mm of wood at once. ✓
- It planes more accurately.
- It planes much faster than a hand plane.

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

2.1.4 By using a generator on site this machine can still be used. ✓

2.2 Measuring of heights ✓

2.2.1 Measuring of distances ✓

2.2.2
- The telescopic level/dumpy level ✓
- The tripod ✓
- Telescopic staff ✓

ANY ONE OF THE ABOVE

2.3

ANY ONE OF THE ABOVE

2.4 When you build cavity walls. ✓

2.5 Pre-stressed concrete ribs/Concrete ribs/Ribs. ✓

2.5.2
- Ribbed bar ✓
- Twisted rib bar
- Square twisted bar
- Round bar

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER
2.5.3
- It acts as additional reinforcement. √
- The steel mesh can be tied to the triangular reinforcing of the rib with binding wire.
- Ensure effective binding between concrete and rib. (1)

**ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER**

2.5.4
At rib and block floors. √ (1)

2.5.5
- Spraying with water
- A patent sealer can be used
- Concrete can be covered with wet sand
- Concrete can be covered with hessian
- Concrete can be covered with canvas
- Concrete can be covered with other protective covering (1)

**ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER**

2.5.6
- Flathead prop √
- Drop head prop
- Multi prop
- Prop (1)

**ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER**

2.6
- Shutter boards should be cleaned after use. √
- All rests/residue of concrete should be removed. √
- All holes should be plugged.
- Release agents or emulsion oil should be applied to the shutter boards. (2)

**ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER**

2.7
- Shuttering (formwork) should be strong enough to carry the load of the wet concrete. √
- It should be able to bear the mass of people and equipment working on it. √
- Formwork material should be made of a material, which can easily be repaired in situ. √
- It should be constructed in such a manner that it can be easily removed and erected.
- It must be assembled accurately.
- It must be sealed off to prevent unnecessary loss of concrete, which may lead to honeycombing.
- It must be clean from dirt such as sawdust and excessive release agent. (3)

**ANY THREE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER**
2.8 2.8.1 A – Shear bar √
        B – Stirrup/binders √
        C – Anchor bar √
        D – Main bar √ (4)

2.8.2 Spacers cover depth blocks/cover depth stand, are used to keep the bars away from shuttering boards (formwork). √ (1)

2.9
- Soleplates are used to create a level surface onto which the scaffold can be erected. √
- It is used to prevent the scaffolding from sinking into the ground.
- It spreads the load of the scaffold, materials and workmen evenly onto the ground. (1)

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

2.10 2.10.1 The weep-hole must be inserted above the horizontal damp-proof course of the external part of the wall. √ (1)

2.10.2 Allow water penetrating the outside wall to drain out of the building. √ (1)

2.10.3
- The cavity ensures that no water will penetrate the inner wall. √
- The cavity provides insulation against heat. √
- The cavity provides insulation against cold.
- The cavity provides insulation against sound. (2)

ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

2.10.4 Weak concrete mixture √ (1)

2.10.5 \[110 + 50 + 110 = 270\] √ (2)

2.11 Waterproof gypsum board/fibre cement board/marine plywood √ (1)

2.12 Normal/Strip foundations are used. √ (1)

2.13 Centre √ (1)

2.14 Intrados √ (1)

[40]
QUESTION 3: CIVIL SERVICES

3.1
3.1.1 B √ (1)
3.1.2 E √ (1)
3.1.3 D √ (1)
3.1.4 C √ (1)
3.1.5 A √ (1)

3.2
• PVC pipe √
• Copper pipe √
• Galvanized pipe √ (3)

3.3
3.3.1 It is to provide water to the tap. √ (1)
3.3.2 Cap B is removable to provide access to the inside of the pipe. √ (1)
3.3.3 Waste water pipe/PVC pipe/Galvanised pipe √ (1)
3.3.4 40 mm/50 mm √ (1)
3.3.5 It is used to anchor the pipe to the wall. √ (1)
3.3.6 It is used to guide the wastewater directly into the gully. √ (1)
3.3.7 100 mm interior/110 mm exterior √ (1)
3.3.8 • The purpose is to form a water seal/water trap/water lock. √
    • To prevent bad odours and gasses from the sewer entering back into the building. (1)

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

3.3.9 P – trap √ (1)

3.4
3.4.1 Wash tub √ (1)
3.4.2 Sewer line/drain pipes √ (1)
3.4.3 Safety valve √ (1)
3.4.4 Storm water drain pipes √ (1)

3.5
• It contains chemicals that are poisonous to the bacteria in the tank. √
• The tank will fill up quickly and block the system. √ (2)
3.6

A – Stopcock ✓

B – Pressure control valve ✓

C – Vacuum breaker ✓

D – Drain cock/Cold water inlet ✓

E – Drip tray ✓

F – Safety valve/Hot water outlet ✓

G – Hot water cylinder/Geyser ✓
QUESTION 4: QUANTITIES, MATERIALS AND JOINING

4.1 4.1.1 1 130 mm \( \checkmark \) (1)
4.1.2 150 mm \( \checkmark \) (1)
4.1.3 114 mm \( \checkmark \) (1)
4.1.4 Window stile \( \checkmark \) (1)
4.1.5 44 mm \( \checkmark \) (1)
4.1.6 54 mm \( \checkmark \) (1)
4.1.7 4 \( \checkmark \) (1)

4.2 4.2.1 B \( \checkmark \) (1)
4.2.2 A \( \checkmark \) (1)
4.2.3 D \( \checkmark \) (1)
4.2.4 C \( \checkmark \) (1)
4.2.5 D \( \checkmark \) (1)

4.3  
- Galvanising hoop iron is used to tie down or attach roof trusses to the brickwork. \( \checkmark \)
- To fix wall plates to walls.
- For cross bracing of roof trusses.
- To secure timber frames to brick work.
- To join existing brickwork to new brickwork

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER

4.4 Steel nails \( \checkmark \) (1)

4.5  
- Rawl bolts \( \checkmark \)
- Chemical fasteners in conjunction with threaded rods and nuts
- Sleeve anchors can be used.

ANY ONE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWER
### 4.6

#### 4.6.1

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td><strong>Internal measurement of:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long walls  = 10 040 / 2 / 220</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>= 9 600</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short walls  = 5 240 / 2 / 220</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>= 4 800</td>
<td></td>
<td></td>
<td></td>
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#### 4.6.2

<p>| | | | |</p>
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<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>1/</td>
<td>9, 6</td>
<td></td>
<td>Internal area of room:</td>
</tr>
<tr>
<td>x 4, 8</td>
<td>46, 08 m²</td>
<td></td>
<td>Inside length = 9 600 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inside width = 4 800 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Area is 46,08 m²</td>
</tr>
</tbody>
</table>

#### 4.6.3

<p>| | | | |</p>
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<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>1/</td>
<td>0, 6</td>
<td></td>
<td>Area of one tile:</td>
</tr>
<tr>
<td>x 0, 6</td>
<td>0, 36 m²</td>
<td></td>
<td>Size of one tile = 600 mm x 600 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Area is 0, 36 m²</td>
</tr>
</tbody>
</table>

\[
\text{Total no. of tiles} = \frac{\text{Internal area of room}}{\text{Area of one tile}}
\]

\[
= \frac{46,08}{0,36}
\]

\[
= 128 \text{ tiles are needed}
\]
QUESTION 5: APPLIED MECHANICS

5.1  5.1.1  90 mm x 30 mm = 2 700 mm² \( \checkmark \)  

5.1.2  60 mm x 60 mm = 3 600 mm² OR 3 150 mm² \( \checkmark \)  

5.1.3  15 mm x 30 mm = 450 mm² \( \checkmark \)  

5.1.4  2 700 mm + 3 600 mm – 450 mm = 5 850 mm² \( \checkmark \)  

5.1.5  55 mm \( \checkmark \)  

5.1.6  45 mm \( \checkmark \)  

5.1.7  40 mm \( \checkmark \)  

5.1.8  45 mm \( \checkmark \)
5.2

SPACE DIAGRAM

5.2.1

VECTOR DIAGRAM

5.2.2

<table>
<thead>
<tr>
<th>MEMBER</th>
<th>NATURE</th>
<th>MAGNITUDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE</td>
<td>Strut</td>
<td>95.2 N</td>
</tr>
<tr>
<td>DE</td>
<td>Tie</td>
<td>47.6 N</td>
</tr>
</tbody>
</table>

NOT ACCORDING TO SCALE

USE A MASK TO MARK THIS QUESTION

Tolerance of 1 N to either side
5.3.1

13 N

5 N

5 N/m

3 N

8 N

12 N

4 N

3 N

LR = 13 N

SPACE DIAGRAM

RR = 14 N

SHEAR FORCE DIAGRAM

NB: 14 - 3 = +11

5.3.2

26 N

30 N

22 N

0

BENDING MOMENT DIAGRAM

(5)

[30]
## ANSWER SHEET 6.1

<table>
<thead>
<tr>
<th>NO.</th>
<th>QUESTIONS</th>
<th>ANSWERS</th>
<th>MARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Identify the type of eave construction used in the drawing.</td>
<td>Open/exposed eave</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>State the minimum pitch (slope) of number 1.</td>
<td>10°</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>State the standard dimension of number 2.</td>
<td>114 mm x 38 mm</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Draw the drawing symbol for number 3.</td>
<td>![Drawing Symbol]</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Name the colour coding for number 3.</td>
<td>Red</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Explain the purpose of number 4.</td>
<td>It is used to spread the load of the roof evenly onto the supporting walls of the building.</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>State the standard dimension of number 5.</td>
<td>50 mm x 76 mm</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>State the centre-to-centre spacing for number 5.</td>
<td>900 mm to 1 200 mm</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>As a draughtsman, recommend a suitable roof truss for a building with a span of 4 metres.</td>
<td>King post roof truss, SA (Howe) roof truss, W-roof truss, Couple roof</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>State the width of the wall indicated by number 6.</td>
<td>110 mm</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Draw the top view of the layout of a gable roof for the proposed building indicated in the answer column.</td>
<td>![Gable Roof Diagram]</td>
<td>5</td>
</tr>
</tbody>
</table>

**TOTAL 15**
QUESTION 6: GRAPHICS AND COMMUNICATION

ANSWER SHEET 6.2

NOT TO SCALE: USE A MASK TO MARK THIS QUESTION

West elevation
Scale 1: 50
Application of scale

[40]
TOTAL: 200