This memorandum consists of 17 pages.
### QUESTION 1    LO 3 AS 1, 2, 4, 5, 7, 10

<table>
<thead>
<tr>
<th>TERMINOLOGY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.1 Tripod</td>
<td>J ✓ stand on which dumpy level is mounted</td>
</tr>
<tr>
<td>1.1.2 Gradient</td>
<td>H ✓ angle or slope of fall for a sewerage system</td>
</tr>
<tr>
<td>1.1.3 Excavation</td>
<td>K ✓ removal of soil to form a trench</td>
</tr>
<tr>
<td>1.1.4 Green building</td>
<td>A ✓ environmentally friendly building built with environmentally friendly materials and systems</td>
</tr>
<tr>
<td>1.1.5 Pollution</td>
<td>I ✓ contamination of water, air or soil</td>
</tr>
<tr>
<td>1.1.6 Aluminium</td>
<td>B ✓ type of metal that will not rust</td>
</tr>
<tr>
<td>1.1.7 Perspex</td>
<td>L ✓ can be used in the place of glass</td>
</tr>
<tr>
<td>1.1.8 Gypsum board</td>
<td>E ✓ used as ceiling materials</td>
</tr>
<tr>
<td>1.1.9 Cement fibre</td>
<td>D ✓ roof sheeting is made of this material</td>
</tr>
<tr>
<td>1.1.10 Formwork</td>
<td>G ✓ temporary support for concrete when the concrete is being cast</td>
</tr>
</tbody>
</table>

1.2
- Make a person lie in a comfortable position. ✓
- Ensure that the air passage is open. ✓
- Monitor pulse. ✓
- The legs may be lifted 30 centimetres and the clothes should be loosened. ✓
- Do not try to make the casualty sit or stand up. ✓

ANY FOUR OF THE ABOVE OR OTHER ACCEPTABLE ANSWERS

(10)
1.3.1 & 1.3.2

Correctness of: Marks

<table>
<thead>
<tr>
<th>Label</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA roof truss</td>
<td>2</td>
</tr>
<tr>
<td>Fink roof truss</td>
<td>2</td>
</tr>
<tr>
<td>Any two labels</td>
<td>2</td>
</tr>
</tbody>
</table>

1.4
- Type of roof covering. ✓
- The size of the batten.

1.5
- Hard hat ✓ Worn inside and outside buildings that are under construction ✓
- No smoking ✓ Placed where flammable and explosives are stored ✓
- No pedestrians ✓ Placed where construction is taking place and a danger to pedestrians ✓ Where walking is prohibited

ANY OTHER ACCEPTABLE ANSWERS

1.6
- Long steel bolts are placed into wet concrete. ✓
- Allow concrete to dry. ✓
- Weld base plate to column/Drill holes in base plate. ✓
- At a later stage when the concrete is dry, the column fitted with a steel foot plate with holes is placed over the bolts.
- The column is then bolted firmly onto the concrete base.

ANY THREE OF THE ABOVE OR OTHER ACCEPTABLE ANSWERS

[30]
QUESTION 2  LO 3  AS 3, 4, 5, 7

2.1  2.1.1  A – steel helmet/cap. ✓
      B – preformed concrete pile. ✓
      C – steel driving plate. ✓
      (3)

2.1.2  • Unstable or soft soil. ✓
      • On unstable soil or ground.
      • Where the soil is loose.
      • Non-cohesive soil.
      • Where there is soil movement.
      • Constantly wet areas.
      (1)

      ANY ONE OF THE ABOVE OR OTHER ACCEPTABLE ANSWERS

2.2  • Bricks ✓
     • Tiles ✓
     • Corrugated iron
     • Concrete
     • Asbestos – Fibre cement
     • PVC
     • Metals
     (2)

      ANY TWO OF THE ABOVE OR OTHER ACCEPTABLE ANSWERS

2.3  BM – Benchmark ✓
     BS – Back sight ✓
     (1)

2.4  | ASPECTS | IN SITU CONCRETE FLOOR SLABS | BLOCK AND BEAM FLOOR SLABS |
      |         |                          |                            |
      | Cost    | Expensive ✓              | Economical ✓               |
      | Duration| Takes long to install ✓  | Quick to install ✓         |
      | Formwork| Formwork needs to be erected ✓ | Formwork is not required ✓ |
      | Insulation| Poor insulation qualities | Good sound and thermal insulation |
      | Labour  | Skilled labour is required to erect | No skilled labour is required to install |
      | Weight  | Heavy                      | Lighter in weight          |
      (6)

      ANY THREE FROM EACH CATEGORY OR OTHER ACCEPTABLE ANSWERS
2.5  
- Increase the ability of the concrete to carry heavier loads. ✓
- The volume of concrete of a beam or column can now be reduced due to the extra strength of the steel. ✓
- Increase the tensile strength of the concrete.
  **ANY TWO OR ANY OTHER ACCEPTABLE ANSWERS**

2.6  
2.6.1  
- Plastic spacers. ✓
- Steel stands. ✓
- Concrete blocks. ✓
  **ANY TWO OR ANY OTHER ACCEPTABLE ANSWERS**

2.6.2  
- To prevent steel from rusting. ✓
- To protect the steel from excessive heat in case of fire.
- To protect the steel from deterioration when used in certain situations such as sea water.
  **ANY ONE OR ANY OTHER ACCEPTABLE ANSWERS**

2.7  
2.7.1  
Independent scaffold. ✓

2.7.2  
- It prevents the vertical standards from sinking into the ground. ✓
- It provides a level flat surface on which the scaffold is erected. ✓
  **ANY TWO OR ANY OTHER ACCEPTABLE ANSWERS**

2.7.3  
- Do not throw any tools or materials from a scaffold. ✓
- Never jump off a scaffold. ✓
- Never overload a scaffold.
- Remove or cover sharp edges or corners.
- Always attach free-standing scaffoldings to a building.
  **ANY TWO OR ANY OTHER ACCEPTABLE ANSWERS**

2.7.4  
- It prevents workers from falling off the scaffold. ✓
- To prevent materials from falling off the scaffold. ✓
- Used as a hand rail.
- It used to strap on safety harnesses.
  **ANY TWO OR ANY OTHER ACCEPTABLE ANSWERS**

2.7.5  
- To keep the scaffold steady. ✓
- To brace the scaffold. ✓
  **OR ANY OTHER ACCEPTABLE ANSWERS**

2.7.6  
- To prevent materials from falling off the scaffold. ✓
- To prevent tools from falling off the scaffold. ✓
  **OR ANY OTHER ACCEPTABLE ANSWERS**

2.8  
REFER TO ANSWER SHEET 2.8
QUESTION 3  LO 3 AS 5, 8

3.1
• Pipes and gas bottles must be checked regularly. ✓
• Gas leaks must be checked using soap and water not open flames. ✓
• Close the shut-off valve when the system is not in use. ✓
• Do not allow open flames near gas bottles. ✓
• Ensure that the pilot flame trigger is in good working order.
• Refill gas bottles when empty, not when half full.
• Check and clean chimneys regularly. (Method: Test by warming the chimney with a blowlamp for five minutes. Light a smoke tablet and hold it at the bottom end of the chimney to see if it draws properly).

ANY FOUR OF THE ABOVE (4)

3.2

![Diagram of manhole cover, concrete cover slab, inflow, waterproof cement plaster, reinforced concrete floor slab, outflow, and fall/slope with checkmarks.]

FIGURE 3.2

NOTE: Other sketches showing the basic principles as indicated above will also be correct.

<table>
<thead>
<tr>
<th>CORRECTNESS OF DRAWING</th>
<th>MARK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manhole cover</td>
<td>1</td>
</tr>
<tr>
<td>Concrete cover slab</td>
<td>1</td>
</tr>
<tr>
<td>Inflow</td>
<td>1</td>
</tr>
<tr>
<td>Waterproof cement plaster</td>
<td>1</td>
</tr>
<tr>
<td>Reinforced concrete floor slab</td>
<td>1</td>
</tr>
<tr>
<td>Outflow</td>
<td>1</td>
</tr>
<tr>
<td>Fall/Slope/Gradient</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL FOR DRAWING</td>
<td>7</td>
</tr>
<tr>
<td>1 mark for each of the above labels</td>
<td>7</td>
</tr>
<tr>
<td>GRAND TOTAL</td>
<td>14</td>
</tr>
</tbody>
</table>
3.3  
3.3.1 Sun ✓
3.3.2 Reduce/cut ✓
3.3.3 Hydro energy ✓
3.3.4 Waste products ✓

OR ANY OTHER ACCEPTABLE ANSWERS

3.4

<table>
<thead>
<tr>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar energy is reliable ✓</td>
<td>The initial investment cost, although falling, is still very high ✓</td>
</tr>
<tr>
<td>Involves no moving parts ✓</td>
<td>Very large areas of solar panels are required to produce useful amounts of electricity ✓</td>
</tr>
<tr>
<td>Maintenance cost is very low</td>
<td>Generates only DC (direct current)</td>
</tr>
<tr>
<td>Solar energy operation is silent</td>
<td>Work only when sunlight is available</td>
</tr>
</tbody>
</table>

ANY TWO IN EACH CATEGORY

3.5  
3.5.1 A Compression joint ✓ 
     B Capillary joint ✓

3.5.2 COMPRESSION JOINT  
                          CAPILLARY JOINT  
                          Quicker to assemble ✓  
                          Cheaper ✓  
                          Can be easily dismantled  
                          Lighter than compression fittings

OR ANY OTHER ACCEPTABLE ANSWERS

[30]
## QUESTION 4  LO 3 AS 2, 3, 7, 8

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>4.1.1</td>
<td>1/</td>
<td>9,11</td>
<td>55,66 m²</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.2</td>
<td>2/</td>
<td>8,67</td>
<td>17,34 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2/</td>
<td>5,67</td>
<td>11,34 m</td>
</tr>
</tbody>
</table>

### A  B  C  D

1/ 8,67  17,34 m  Length of skirting of long wall

1/ 5,67  11,34 m  Total length of skirting for short walls

### Area of building

Area of building = 9,110 – 0,440

= 8,67 m

### Inside length of long walls

Inside length of long walls = 9,110 – 0,440

= 8,67 m

### Inside length of short walls

Inside length of short walls = 6,110 – 0,440

= 5,67 m

### Total length of skirting for short walls

Total length of skirting required = 16,44 + 11,34

= 27,78 m

Therefore 27,8 m of skirting is required.

### Volume of concrete for floor slab

Volume of concrete for floor slab = 3,69 m³

Therefore 3,69 m³ of concrete is needed for the floor slab

### Cost of concrete slab

Cost of concrete slab = R2 121,75

Therefore the cost of concrete is R2 121,75

OR
4.1.1 Area of building = 9,11 m x 6,11 m ✓
   = 55,66 m² ✓

4.1.2 Inside measurements – long walls = 9 110 mm – 440 mm
   = 8 670 mm ✓
Length of skirting – long walls = 2(8 670 mm) – 900 mm
   = 17 340 mm – 900 mm
   = 16 440 mm ✓

Inside measurements – short walls = 6 110 mm – 440 mm
   = 5 670 mm ✓
Length of skirting – short walls = 5 670 mm x 2
   = 11 340 mm ✓

Total length of skirting = 16 440 mm + 11 340 mm
   = 27 780 mm ✓

4.1.3 Volume of concrete for floor slab = length x breadth x depth
   = 8,67 m x 5,67 m x 0,075 mm ✓
   = 3,69 m³ ✓

4.1.4 Cost of concrete slab = 3,69 m³ x R575,00 ✓
   = R2 121,75 ✓

4.2 4.2.1 False ✓
    (1)
4.2.2 True ✓
    (1)
4.2.3 False ✓
    (1)
4.2.4 False ✓
    (1)
4.2.5 False ✓
    (1)
4.2.6 True ✓
    (1)
4.2.7 True ✓
    (1)

4.3 4.3.1 • Particle board (chipboard) ✓
    • Compressed fibre board (supawood) ✓
    • Plywood
    • Laminated board/melamine chip board
      ANY TWO OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWERS
4.3.2 BOARD PRODUCTS
Available in large sheets ✓
More stable than solid timber

SOLID TIMBER
Available in narrow widths ✓
Twists and warps if not seasoned properly

OR ANY OTHER ACCEPTABLE ANSWERS (2)

4.3.3
• The wood must be thoroughly sanded and dusted. ✓
• Fill open grain and holes using wood filler that suits the wood. ✓
• Seal the surface with sanding sealer. ✓
• Rub down with fine sandpaper and dust off. ✓
• Apply varnish with a soft brush or spray gun.
• Let dry and sand with fine sandpaper- smooth the wood, but don’t remove the varnish.
• Apply the next coat of varnish – several coats may be applied, which must be sanded between coats. (4)

ANY FOUR OF THE ABOVE

4.4 4.4.1
• The mould must first be cleaned. ✓
• Apply with mould oil or release oil on the inside. ✓ (2)

4.4.2
• The concrete should be placed in the mould in layers of 50 mm each. ✓
• Each layer should be tamped at least 45 times with a rounded tamping rod to get rid of all the air bubbles. ✓
• The last layer should be filled higher than the top of the mould and then struck off with a steel float. (2)

ANY TWO OR ANY OTHER ACCEPTABLE ANSWERS [30]
QUESTION 5  LO 3 AS 5, 6

5.1 5.1.1 Distance of centroid of rectangle from A-A = 115 mm ✓ (1)

5.1.2 Distance of centroid of right angle triangle from A-A = 60 mm ✓ (1)

5.1.3 Position of centroid = \((A_1 \times d) + (A_2 \times d)\)
\[
\text{Total Area} = \frac{(5 000 \times 115) + (1 350 \times 60)}{6 350} ✓
\]
\[
= 575 000 + 81 000
\]
\[
= 656 000 \text{ mm}^3 ✓
\]
\[
= 103,31 \text{ mm} ✓✓
\]

OR
Take moments about B left side
\[
6 350 \text{ mm}^2 \times X = (5 000 \times 115) + (1 350 \times 60)
\]
\[
= 575 000 + 81 000
\]
\[
= 656 000 \text{ mm}^3 ✓
\]
\[
= 103,31 \text{ mm} ✓✓
\]

OR

<table>
<thead>
<tr>
<th>AREA (A)</th>
<th>X</th>
<th>Area of Y (Ay)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectangle</td>
<td>5 000 ✓</td>
<td>L = 50 = 25 + 90 = 115 ✓</td>
</tr>
<tr>
<td>Triangle</td>
<td>+ 1 350 ✓</td>
<td>b = 90 = 30 From right angle 3 3 90 – 30 = 60 ✓</td>
</tr>
<tr>
<td>Σ</td>
<td>6 350 ✓</td>
<td></td>
</tr>
</tbody>
</table>

\[
\frac{\Sigma Ax}{\Sigma A} = \frac{656 000 \text{ mm}^3} {6 350 \text{ mm}^2} ✓
\]
\[
= 103,31 \text{ mm} ✓✓
\]
5.2  
5.2.1 REFER TO ANSWER SHEET 5.2  
5.2.2 REFER TO ANSWER SHEET 5.2  
5.2.3 REFER TO ANSWER SHEET 5.2

5.3 Take moments around RL

\[
5 \text{ RR } = (3 \text{ kN} \times 0 \text{ m}) + (4 \text{ kN} \times 1 \text{ m}) + (5 \text{ kN} \times 3 \text{ m}) + (4 \text{ kN} \times 4 \text{ m}) \checkmark \\
= 0 \text{ kN} \text{m} + 4 \text{ kNm} + 15 \text{ kNm} + 16 \text{ kNm} \checkmark \\
RR = \frac{35 \text{ kNm}}{5 \text{ m}} \checkmark \\
RR = 7 \text{ kN} \checkmark \checkmark
\]

QUESTION 6  LO 6 AS 4, 5, 7, 8

6.1 REFER TO ANSWER SHEET 6.1  
6.2 REFER TO ANSWER SHEET 6.2

Copyright reserved Please turn over
QUESTION 2.8

ANSWER SHEET 2.8

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall thickness measurement</td>
<td>1</td>
</tr>
<tr>
<td>Wall penetration measurement</td>
<td>1</td>
</tr>
<tr>
<td>Wall drawn and labelled</td>
<td>1</td>
</tr>
<tr>
<td>Concrete floor drawn and labelled</td>
<td>1</td>
</tr>
<tr>
<td>Reinforcing mesh drawn and labelled</td>
<td>2</td>
</tr>
<tr>
<td>Minimum concrete cover shown and labelled</td>
<td>1</td>
</tr>
<tr>
<td>Floor thickness measurement</td>
<td>1</td>
</tr>
<tr>
<td>Concrete symbol</td>
<td>1</td>
</tr>
<tr>
<td>Scale (Accuracy of drawing)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

SCALE 1:10
QUESTION 5.2

ANSWER SHEET 5.2

Space diagram

Force diagram
Scale 1 mm = 1N

<table>
<thead>
<tr>
<th>MEMBER</th>
<th>NATURE</th>
<th>MAGNITUDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BF</td>
<td>Strut</td>
<td>34.6 N</td>
</tr>
<tr>
<td>CG</td>
<td>Strut</td>
<td>75 N</td>
</tr>
<tr>
<td>DG</td>
<td>Tie</td>
<td>37.5 N</td>
</tr>
<tr>
<td>DE</td>
<td>Tie</td>
<td>31.7 N</td>
</tr>
</tbody>
</table>

Allow a tolerance of 1 N on either side.
### QUESTION 6.1

### 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>What is the scale of the drawing?</td>
<td>1 : 100</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Identify number 1.</td>
<td>Ridge capping</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Identify number 2.</td>
<td>Roof sheeting</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Identify number 3.</td>
<td>Purlin</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Identify number 4.</td>
<td>King post</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Identify number 5.</td>
<td>Beam filling</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>What colour is used to indicate new brickwork on a drawing?</td>
<td>Red</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Identify number 6.</td>
<td>Gutter</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Identify number 7.</td>
<td>Window</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Identify number 8.</td>
<td>Window sill</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Identify number 9.</td>
<td>Screed/Topping</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Identify number 10.</td>
<td>Rainwater downpipe</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Identify number 11.</td>
<td>Strip foundation</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Identify number 12.</td>
<td>Natural ground level</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>Draw freehand the symbol for a wash hand basin.</td>
<td><img src="image" alt="Symbol" /></td>
<td>1</td>
</tr>
</tbody>
</table>

(15)
QUESTION 6.2

ANSWER SHEET 6.2

SOUTH ELEVATION
SCALE 1 : 100

Accuracy and neatness ✓

Galvanised roof sheeting ✓
Plaster and paint / Face brick ✓
Roof pitch 30° ✓
FFL ✓
NGL ✓

(25)
Use a mask to mark this drawing.

Deduct 3 marks if wrong section was drawn.

<table>
<thead>
<tr>
<th>CORRECTNESS AND ACCURACY OF:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof construction</td>
<td>3</td>
</tr>
<tr>
<td>Fascia boards</td>
<td>1</td>
</tr>
<tr>
<td>Gutters</td>
<td>2</td>
</tr>
<tr>
<td>Down pipe</td>
<td>2</td>
</tr>
<tr>
<td>Windows</td>
<td>2</td>
</tr>
<tr>
<td>Door</td>
<td>1</td>
</tr>
<tr>
<td>Step</td>
<td>1</td>
</tr>
<tr>
<td>Wall</td>
<td>2</td>
</tr>
<tr>
<td>Window sills</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LABELS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Finished floor level</td>
<td>1</td>
</tr>
<tr>
<td>Natural ground level</td>
<td>1</td>
</tr>
<tr>
<td>Wall finishing</td>
<td>1</td>
</tr>
<tr>
<td>Roof pitch</td>
<td>1</td>
</tr>
<tr>
<td>Roof covering</td>
<td>1</td>
</tr>
<tr>
<td>Scale (print)</td>
<td>1</td>
</tr>
<tr>
<td>South elevation (print)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7</strong></td>
</tr>
<tr>
<td>Accuracy/Neatness</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>25</strong></td>
</tr>
</tbody>
</table>

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