



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

CIVIL TECHNOLOGY: CONSTRUCTION

NOVEMBER 2019

MARKING GUIDELINES

MARKS: 200

These marking guidelines consist of 18 pages.

QUESTION 1: OHSA, SAFETY, MATERIALS, TOOLS, EQUIPMENT AND JOINING (GENERIC)

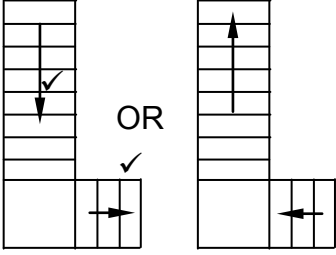
- 1.1 1.1.1 B ✓ (1)
- 1.1.2 I ✓ (1)
- 1.1.3 A ✓ (1)
- 1.1.4 G/H ✓ (1)
- 1.1.5 C ✓ (1)
- 1.1.6 F ✓ (1)
- 1.1.7 J ✓ (1)
- 1.1.8 E ✓ (1)
- 1.2 Electroplating:
- protects metals against corrosion. ✓
 - improves the engineering- and mechanical properties of metal. ✓
 - may be used to increase the thickness of undersized parts.
 - is decorative.
 - will extend the life span.
- ANY TWO OF THE ABOVE** (2)
- 1.3 Curing ✓ (1)
- 1.4 The moisture:
- delays/prevents the rapid drying of fresh concrete.
 - prevents concrete from cracking. ✓
 - ensures that fresh concrete hardens properly.
 - allows adhesive bonding.
 - increases strength of fresh concrete.
- ANY ONE OF THE ABOVE** (1)
- 1.5 • When material is transported in bulk, it must be secured firmly. ✓
- When material is transported to higher levels, make sure that workers maintain a safe distance from the material being moved overhead. ✓
- When heavy material is transported with a lift/hoist/machine, a qualified person must take charge of operations.
- Wear appropriate personal protective equipment(PPE).
- Material must be transported in a safe way.
- Transport should not be overloaded with material.
- ANY TWO OF THE ABOVE** (2)

- 1.6 Scaffold planks should:
- be made of a solid wood at least 228 mm wide and 38 mm thick. ✓
 - be able to support the load.
 - be free from defects.
 - not be painted as it will hide defects/be slippery.
 - be supported at distances not exceeding 1,25 m.
 - not project less than 70 mm and not more than 230 mm beyond the ends of the last prop.
 - be firmly secured to prevent its displacement.
 - be placed in such a way to prevent materials and tools from falling through.
- ANY ONE OF THE ABOVE** (1)
- 1.7 1.7.1 Dumpy level ✓ (1)
- 1.7.2 If the dumpy level is not set up level:
- it will give inaccurate readings. ✓
 - wrong levels will be transferred.
 - true levels will not be transferred.
- ANY ONE OF THE ABOVE** (1)
- 1.8 1.8.1 A – Plastic plug/Plug/Rawl plug/Fisher plug/Fibre plug ✓ (1)
- 1.8.2 A screw ✓ (1)
- 1.8.3 Plastic plugs are used to secure:
- cupboards against a wall. ✓
 - mirrors against a wall.
 - portraits and similar objects against a wall.
 - objects, limited to certain weight, against walls.
- ANY ONE OF THE ABOVE** (1)
- [20]**

QUESTION 2: GRAPHICS AS MEANS OF COMMUNICATION (GENERIC)**ANSWER SHEET 2**

| NO. | QUESTIONS | ANSWERS | MARKS |
|-----|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-------|
| 1 | Identify the elevation in FIGURE A. | West Elevation ✓ | 1 |
| 2 | Identify the type of roof that is used on the building in FIGURE A. | Hipped roof ✓ | 1 |
| 3 | Identify number 1. | Ridge Capping/Ridge plate/Ridge tile/Hip cap ✓ | 1 |
| 4 | Identify number 4. | Balcony/Floor slab of balcony/Cantilever/Concrete slab ✓ | 1 |
| 5 | Identify number 5. | External door/Entrance door/Door/Outside door ✓ | 1 |
| 6 | Identify number 7. | Gutter ✓ | 1 |
| 7 | Identify number 8. | Rainwater down pipe/RWDP/Down pipe ✓ | 1 |
| 8 | Identify number 12. | Wash trough/Wash tub ✓ | 1 |
| 9 | Identify number 13. | Built-in cupboard/BIC ✓ | 1 |
| 10 | Identify number 15. | Landing ✓ | 1 |
| 11 | Identify the company that printed the building plan. | Dlamini printers ✓ | 1 |
| 12 | Name a suitable material that can be used for the manufacturing of number 2. | Fibre cement/Galvanised sheeting/Timber/Plastic/PVC/Polyvinylchloride ✓ | 1 |
| 13 | Name the drawing symbol in the column for the notes in FIGURE 2 that must be installed in the kitchen. | Electricity meter/Electrical meter/Watt meter/Prepaid meter ✓ | 1 |
| 14 | Name the drawing symbol in the column for the notes in FIGURE 2 that indicates the type of bricks for the building. | Face brick ✓ | 1 |
| 15 | Name a material that should NOT be used to manufacture the frame of number 9 for coastal areas. | Steel/Mild steel/Iron/Ferrous metals ✓ | 1 |

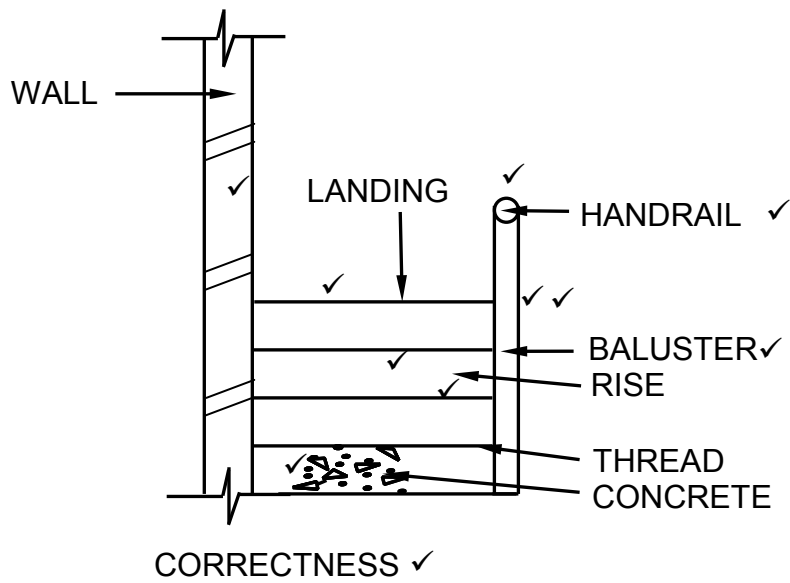
| | | | |
|----|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 16 | Name a material that can be used to manufacture the sanitary fitting indicated by number 11. | Stainless steel/Plastic/Ceramic/Granite/Acrylic/Fibre Glass/Concrete ✓ | 1 |
| 17 | Who checked the building plan? | P Carter ✓ | 1 |
| 18 | How many types of windows are used in FIGURE B? | 2 ✓ | 1 |
| 19 | What does the abbreviation <i>NGL</i> at number 6 stand for? | Natural ground level ✓ | 1 |
| 20 | Give the reference code for this plan. | QP 2-2019 ✓ | 1 |
| 21 | Which room will electrical symbol 16 serve? | Lounge ✓ | 1 |
| 22 | Describe the purpose of number 3. | Prevent people from falling off/through. ✓✓ | 2 |
| 23 | Explain what the curved lines between the electrical installations in FIGURE B indicate. | Electrical wiring/Wiring/Electrical cable/Wiring from light switch to light/Shows which switch operates which electrical fitting. ✓✓ | 2 |
| 24 | Explain why the light switch is mounted on the outside of the bathroom. | To prevent steam/moisture entering the switch/To prevent electrical shock due to moisture/For safety purposes ✓ | 1 |
| 25 | Identify in FIGURE 2 which elevation does NOT have windows. | North elevation ✓ | 1 |
| 26 | Identify the thickness of the internal wall in FIGURE 2. | 110 mm ✓ | 1 |
| 27 | Differentiate between symbols 13 and 15 in terms of their purpose. | 13 – Built-in cupboard: to store items. ✓ 15 – Landing: to rest/safety feature/change of direction of stairs ✓ | 2 |
| 28 | Justify why FIGURE B is a ground floor plan. | Ground floorplan: <ul style="list-style-type: none"> • does not indicate the roofline ✓ • does not indicate the balcony • indicate an entrance door to the house • indicate a step at the entrance door • the position of the windows and door correlate with the positions of the window and door on the west elevation | 1 |

| | | | |
|----|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 29 | Predict what will happen if number 10 is NOT installed. | Water/Damp will penetrate into the wall. ✓ | 1 |
| 30 | Redraw the staircase in FIGURE B in the adjacent column and indicate the direction of the flight with arrows. |  | 2 |
| 31 | Calculate the total length of the wall on the eastern side of the building. Show ALL calculations. | $220 \checkmark + 2\ 600 \checkmark + 110 \checkmark + 3\ 400 \checkmark + 220 \checkmark$ $= 6\ 550 \text{ mm or } 6,55 \text{ m } \checkmark$ <p>IF INCORRECT METHOD IS USED TO CALCULATE THE ANSWER USE THE FOLLOWING SLIDING SCALE:</p> <ul style="list-style-type: none"> • 4 MARKS WILL BE AWARDED IF ALL FIVE VALUES ARE CORRECT • 3 MARKS FOR FOUR VALUES CORRECT • 2 MARKS FOR THREE VALUES CORRECT • 1 MARK FOR 2 VALUES CORRECT | 6 |
| | | TOTAL: | 40 |

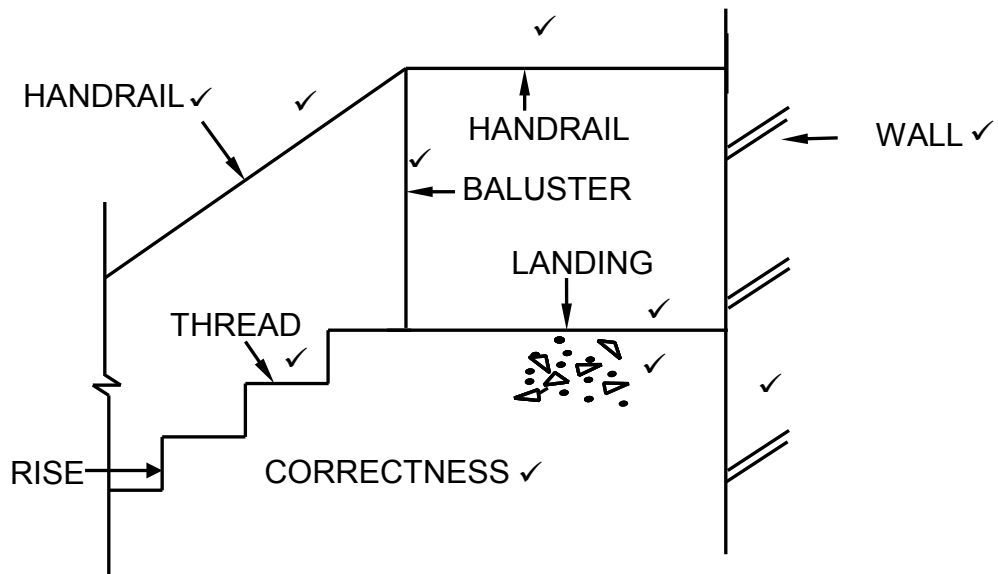
QUESTION 3: ROOFS, STAIRCASES AND JOINING (SPECIFIC)

- 3.1 3.1.1 10° ✓ (1)
- 3.1.2 650 mm ✓ (1)
- 3.1.3 38 mm round poles ✓ (1)
- 3.2 Predrilled hole filled with grout ✓
 Bolt baluster onto the tread
 Baluster bolted/screwed to the side of the tread/string
 Bolt and nut
 ANY ONE OF THE ABOVE (1)
- 3.3 Clout nails/Nails/Screws/Bolts ✓ (1)

3.4



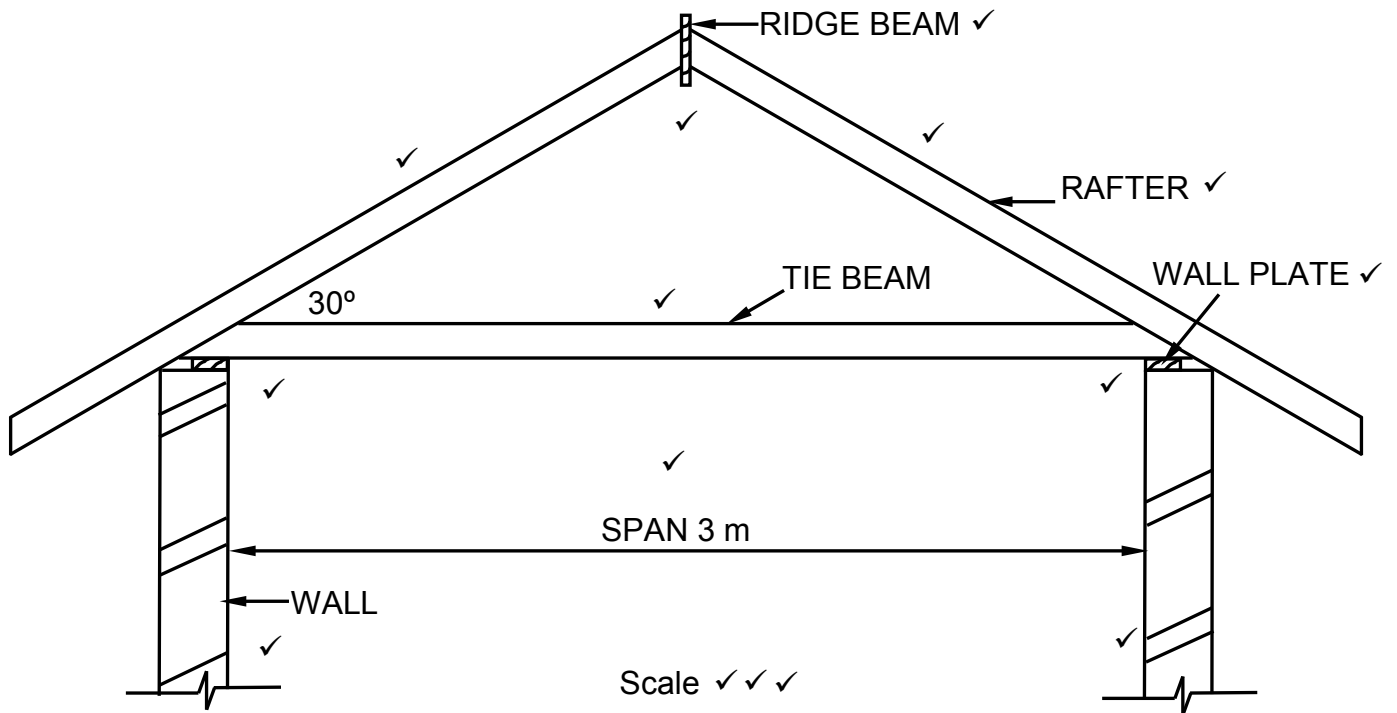
OR



| ASSESSMENT CRITERIA | MARK |
|------------------------|-----------|
| Wall | 1 |
| Landing | 1 |
| Baluster | 1 |
| Handrails | 2 |
| THREE treads | 1 |
| Concrete | 1 |
| Any TWO labels | 2 |
| Correctness of drawing | 1 |
| TOTAL: | 10 |

(10)

3.5



DRAWING NOT TO SCALE
A MASK MUST BE USED TO MARK THIS QUESTION

| ASSESSMENT CRITERIA | MARK |
|------------------------------------------------------------------------------------------------------------------|-----------|
| Walls | 2 |
| Wall plates | 2 |
| Rafters | 2 |
| Ridge beam | 1 |
| Tie beam | 1 |
| Any THREE labels | 3 |
| Dimension of the span | 1 |
| Application of scale: ONE or TWO incorrect = 3 THREE or FOUR incorrect = 2 More than FIVE incorrect = 1 | 3 |
| TOTAL: | 15 |

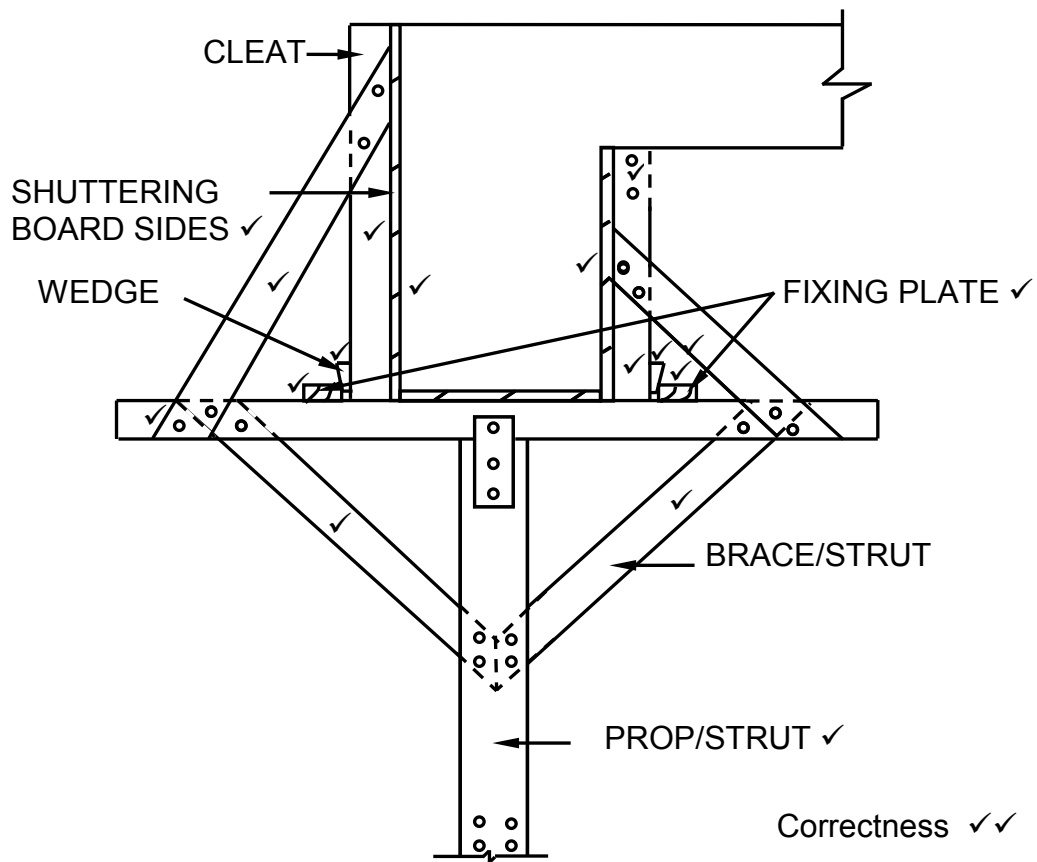
(15)
[30]

QUESTION 4: EXCAVATIONS, FORMWORK, TOOLS, EQUIPMENT AND MATERIALS (SPECIFIC)

- 4.1 4.1.1 600 mm ✓ (1)
- 4.1.2 1 meter ✓ (1)
- 4.1.3
- Heavy rains ✓
 - Poor soil strata, structure or composition ✓
 - Sides not dug at correct angle
 - Improper use of formwork or shoring to support the walls
 - Vibration by machinery or heavy vehicles nearby
 - Water seeping into the excavated area
 - Contact with underground service pipes
 - Access to and exit from the excavation
 - Trucks must not go near the edge of the excavation
 - Soil slides due to cracks or loose soil
- ANY TWO OF THE ABOVE** (2)
- 4.1.4 1,5 meter ✓ (1)
- 4.1.5 Benching can be done/Formwork/Shuttering can be installed ✓ (1)
- 4.2 4.2.1 A- will be used in shallow trenches/loose soil ✓
B- will be used in firm soil ✓ (2)
- 4.2.2 C- Poling boards ✓
D- Walling boards ✓ (2)
- 4.2.3 A – Has no space between the boarding ✓
B – Has open spaces between the boards ✓ (2)
- 4.3 4.3.1 Power trowel float/Power float ✓ (1)
- 4.3.2
- Maintain like all machinery - lubricate and adjust according to the manufacturers, instruction. ✓
 - Clean after use. ✓
 - Store in a safe dry place.
 - Service the power trowel float/power float regularly.
- ANY TWO OF THE ABOVE** (2)
- 4.3.3
- Check for wear and damage parts before use. ✓
 - Check controls for proper response before use. ✓
- (2)

- 4.4 25/30 MPa ✓ (1)
- 4.5
- True slump ✓
 - Shear slump ✓
 - Collapsed slump ✓
- IF THE SECOND PART OF THE ANSWER “SLUMP” IS NOT MENTIONED A MAXIMUM OF 2 MARKS WILL BE AWARDED FOR THE QUESTION.** (3)
- 4.6
- Damp sand/Sand ✓
 - Clean sand
 - Soil
 - Sacking
 - Straw
 - Wood shavings
 - Canvas
 - Hessian
- ANY ONE OF THE ABOVE** (1)

4.7



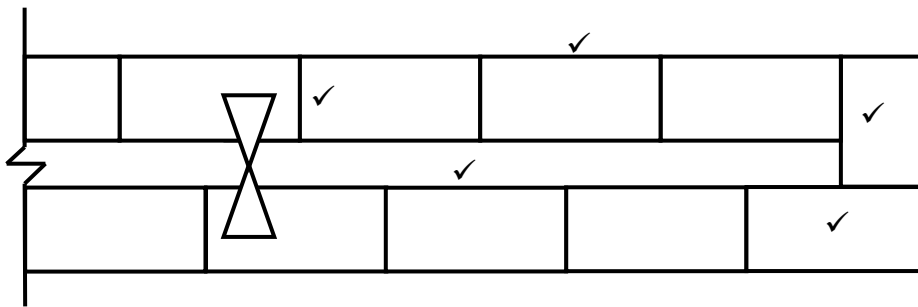
| ASSESSMENT CRITERIA | MARK |
|-----------------------------|-----------|
| Shutter board sides | 2 |
| Cleats | 2 |
| Fixing plates | 2 |
| Wedges | 2 |
| Braces/Struts | 4 |
| Joining of braces to bearer | 1 |
| Any THREE labels | 3 |
| Correctness of drawing | 2 |
| TOTAL: | 18 |

(18)
[40]

QUESTION 5: PLASTER AND SCREED, BRICKWORK AND GRAPHICS AS MEANS OF COMMUNICATION (SPECIFIC)

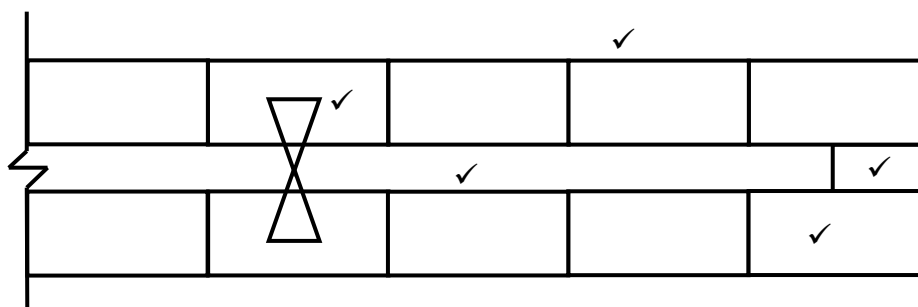
- 5.1
- Smooth plaster finish ✓
 - Wavy plastered surface
 - Bagging plaster finish
 - Spatter dash finish
- ANY ONE OF THE ABOVE** (1)
- 5.2 Wet the wall thoroughly ✓ (1)
- 5.3 Property of good plaster:
- Workable ✓
 - Cohesive
 - Good water retention ability
- ANY ONE OF THE ABOVE** (1)
- 5.4 15 mm to 40 mm ✓ (1)
- 5.5
- 5.5.1 A- Brick/Pavers/Cement paver ✓
B- Bedding/Sand/Bedding sand/Screed ✓
C- Base (mass concrete) ✓
D- Damp proof membrane/DPM/Plastic sheeting/Damp proof course/DPC ✓ (4)
- 5.5.2
- The concrete haunch is too thin to support itself. ✓
 - There is too little weight to retain the structure and to keep the paving in place.
 - The bond between the haunch and the edge units is weak.
 - The sub-base is not contained and will be washed out by ground water.
 - Poor ground preparation.
- ANY ONE OF THE ABOVE** (1)

5.6



Correctness ✓✓

OR

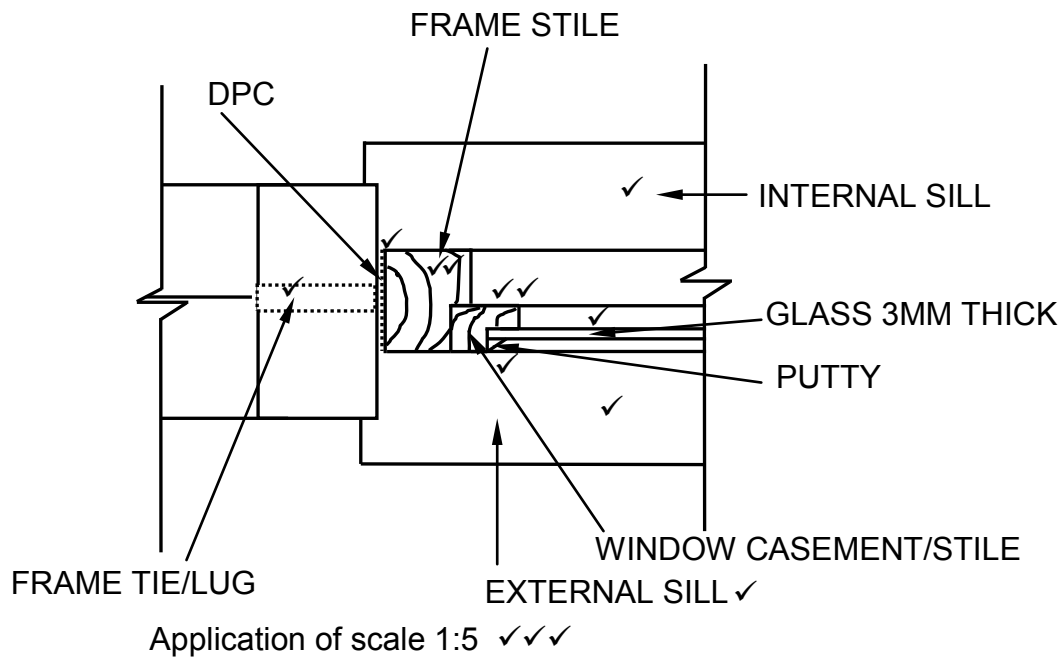


Correctness ✓✓

| ASSESSMENT CRITERIA | MARK |
|---------------------------|----------|
| Dead end | 2 |
| Inner skin of cavity wall | 1 |
| Outer skin of cavity wall | 1 |
| Wall tie (Any type) | 1 |
| Correctness of drawing | 2 |
| TOTAL: | 7 |

(7)

5.7



**DRAWING NOT TO SCALE.
USE A MASK TO MARK THIS QUESTION.**

| ASSESSMENT CRITERIA | MARK |
|------------------------------------------------------------------------------------------------------------------|-----------|
| Frame stile: 105 mm x 70 mm | 2 |
| Window stile/Casement stile: 60 mm x 45 mm | 2 |
| Frame tie/lug: 25 mm wide | 1 |
| Glass: 3 mm thick | 1 |
| Putty | 1 |
| Internal window sill | 1 |
| External window sill | 1 |
| DPC | 1 |
| Any ONE label | 1 |
| Application of scale: ONE or TWO incorrect = 3 THREE or FOUR incorrect = 2 More than FIVE incorrect = 1 | 3 |
| TOTAL: | 14 |

(14)
[30]

QUESTION 6: REINFORCEMENT IN CONCRETE, FOUNDATIONS, CONCRETE FLOORS AND QUANTITIES (SPECIFIC)

- 6.1 6.1.1 D ✓ (1)
- 6.1.2 A/B ✓ (1)
- 6.1.3 C ✓ (1)
- 6.1.4 A ✓ (1)
- 6.1.5 D ✓ (1)

6.2 Pile foundations:

- Should be used when ground conditions are not stable or solid enough to support ordinary foundations. ✓
- Foundation piles distribute the load to more stable ground and can be used as underground or under water supports. ✓
- Piles provide stability when a raft or floating foundation is used.
- When structures are subjected to horizontal forces, pile foundations resist bending stress while still lending vertical support.
- Where soils are prone to swelling and shrinking according to the moisture content.
- When the superstructure is exposed to up-lifting forces.
- Where soil erosion is possible, piles should be used to carry the load of the super structure.

ANY TWO OF THE ABOVE (2)

- 6.3 • Drills ✓
- Tampers ✓
- Pile drop hammer/Drop hammer ✓
- Trucks
- Cranes

ANY THREE OF THE ABOVE (3)

| 6.4 | Steel tube caisson piles | Pre-cast concrete piles |
|-----|-------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| | Steel tube casing driven into the ground using a drop hammer and filled with concrete/cast in situ. ✓ | The whole pre-cast pile is driven into the ground using a drop hammer. ✓ |

(2)

6.5 6.5.1 Rib-and-block floor ✓ (1)

- 6.5.2
- Allow 28 days for the setting of the concrete slab. ✓
 - The concrete has to be kept moist for 7 days after casting to ensure curing. ✓
 - Temporary propping can be removed when the in-situ concrete has reached a crushing strength of 17 MPa. ✓
 - Adhere to the normal formwork striking times.
 - Ensure minimum movement on the rib-and-block floor after casting.
 - Normal construction activities can only continue after the concrete has set properly.
 - Inspect for visible defects.

ANY THREE OF THE ABOVE (3)

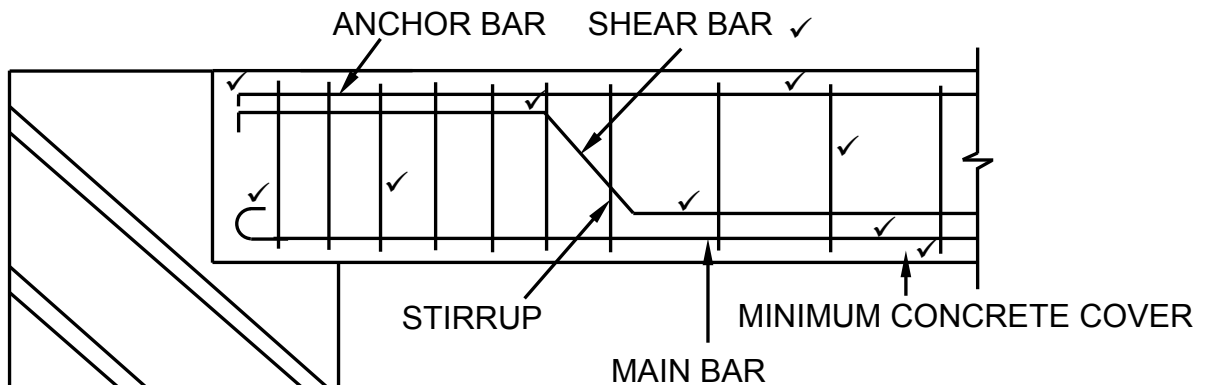
6.5.3 In-situ concrete/Mass concrete/Reinforced concrete ✓ (1)

6.5.4 The width/length/size of the concrete hollow block. ✓ (1)

- 6.5.5
- The concrete can crack. ✓
 - The structural integrity of the concrete may be compromised.
 - Concrete/Structure can collapse.

ANY ONE OF THE ABOVE (1)

6.6



Correctness ✓

| ASSESSMENT CRITERIA | MARK |
|-----------------------------|-----------|
| Anchor bar | 2 |
| Shear bar | 2 |
| Spacing of Stirrups/Binders | 2 |
| Main bar | 2 |
| Minimum concrete cover | 1 |
| Any ONE label | 1 |
| Correctness of drawing | 1 |
| TOTAL: | 11 |

(11)

6.7

| | A | B | C | D | |
|-------|------|---------------|-----------|----------------------------------------------------------------------|-----|
| 6.7.1 | | | | Total length of wall plate needed: | |
| | | | | | |
| | 2/ ✓ | <u>8,56</u> ✓ | 17,12 m ✓ | Length of the wall = 9 000 mm ✓ – 2/220 ✓ = 8 560 mm | (5) |
| | | | | NO UNIT IN FINAL ANSWER NO MARK | |
| 6.7.2 | | | | Number of roof trusses needed: | |
| | | | | <u>Internal dimension</u> + 1 roof truss Distance between centres | |
| | | | | <u>8 560 mm</u> ✓ + 1 roof truss ✓ <u>1 070 mm</u> ✓ | |
| | | | | = 8 + 1 roof truss ✓ | |
| | | | | = 9 roof trusses needed ✓ | (5) |

[40]**TOTAL: 200**