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)

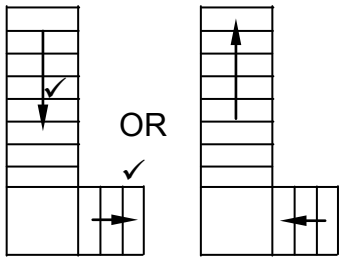
[20]

QUESTION 2: GRAPHICS AS MEANS OF COMMUNICATION (GENERICS)

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

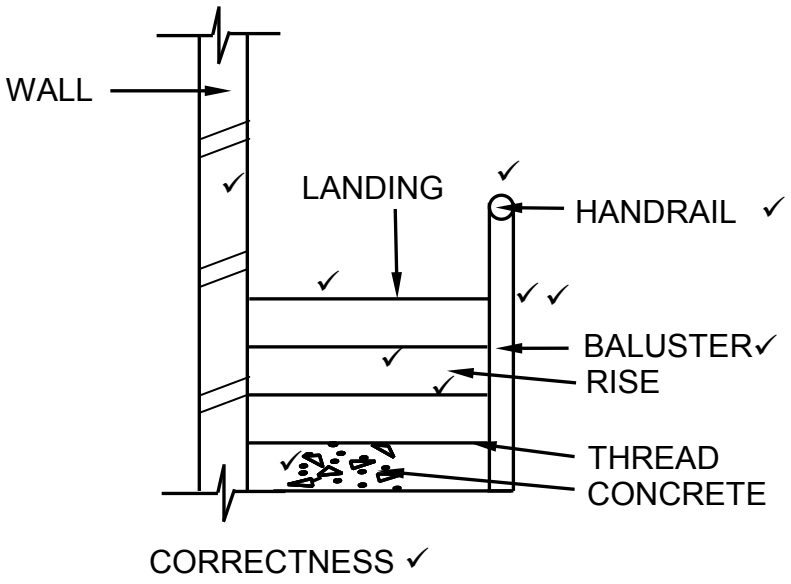
16	Name a material that can be used to manufacture the sanitary fitting indicated by number 11.	Stainless steel/Plastic/Ceramic/ Granite/Acrylic/Fibre Glass/Concrete✓	1
17	Who checked the building plan?	P Carter ✓	1
18	How many types of windows are used in FIGURE B?	2 ✓	1
19	What does the abbreviation *NGL* 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: • 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 ✓ + 2 600 ✓ + 110 ✓ + 3 400 ✓ + 220 ✓ = 6 550 mm or 6,55 m ✓ **IF INCORRECT METHOD IS USED TO CALCULATE THE ANSWER USE THE FOLLOWING SLIDING SCALE:** • **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**

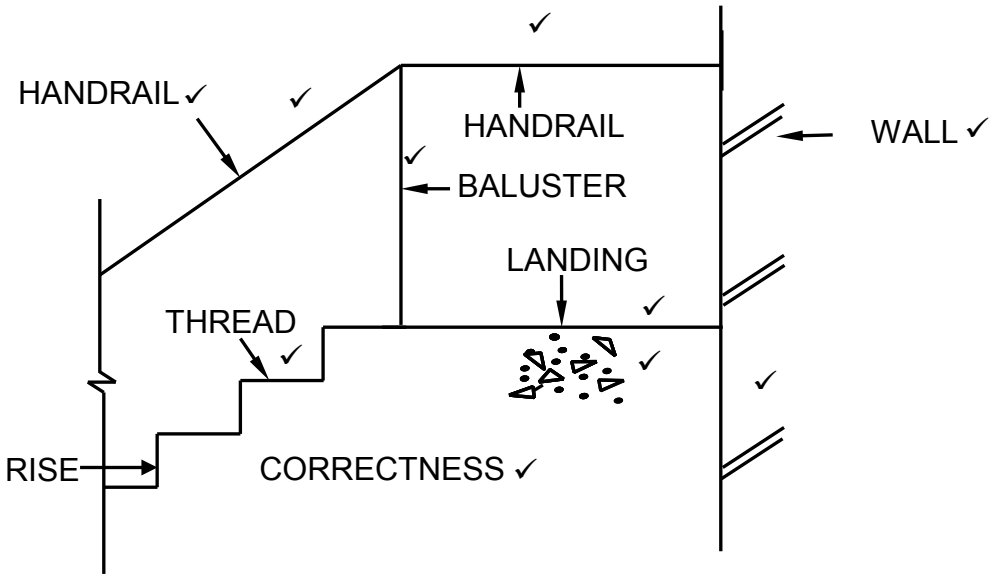
QUESTION 3: ROOFS, STAIRCASES AND JOINING (SPECIFIC)

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



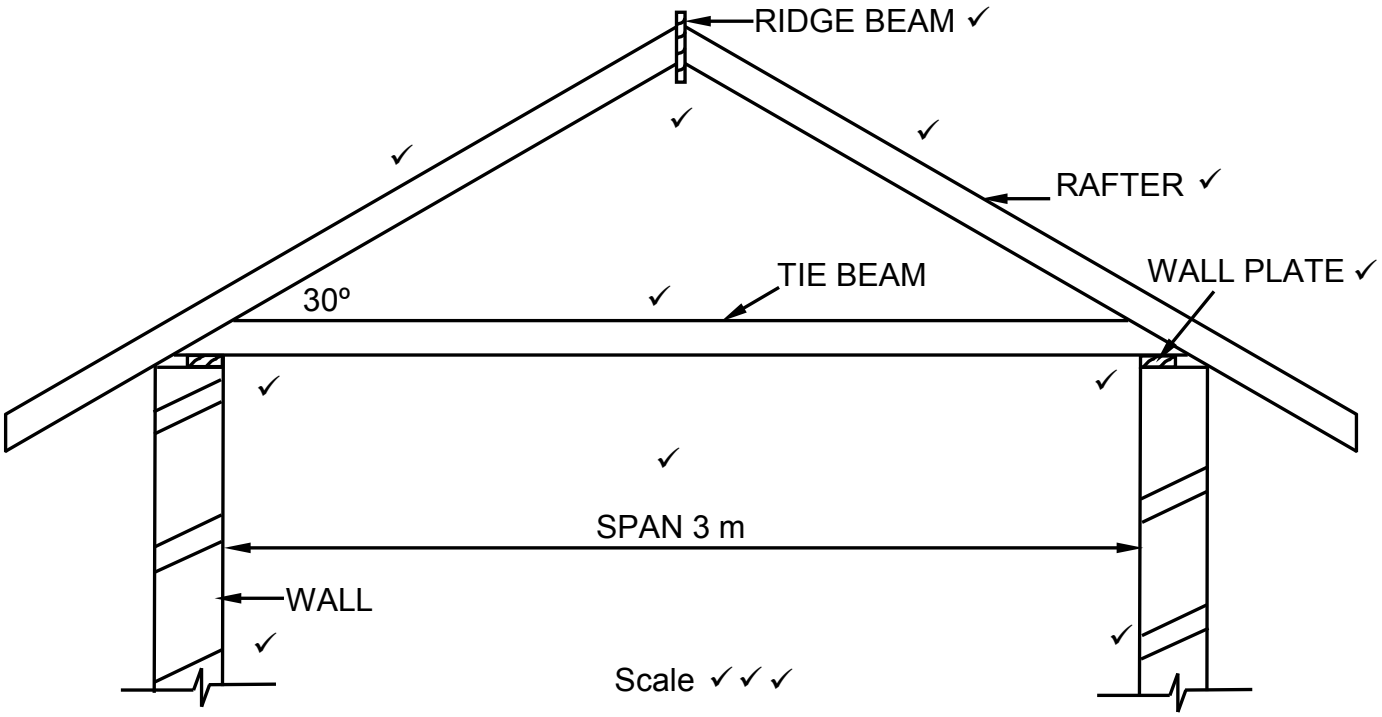
OR



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)

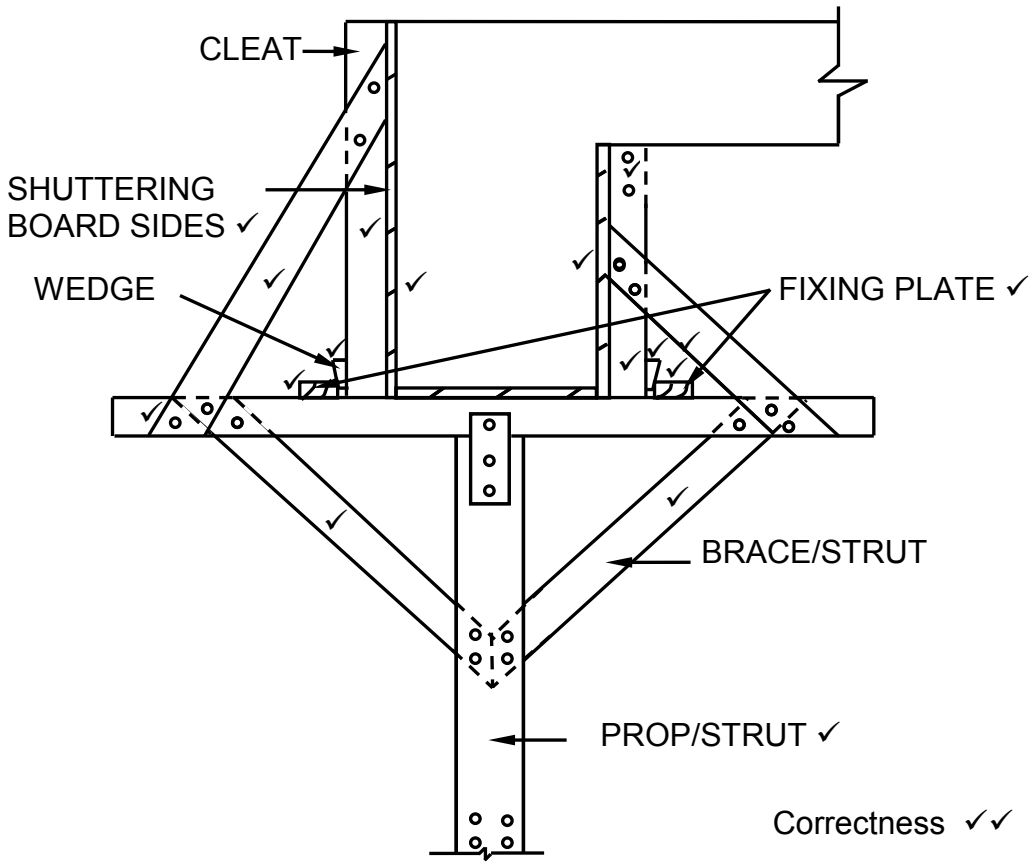
4.5
- True slump ✓
- Shear slump ✓
- Collapsed slump ✓

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)

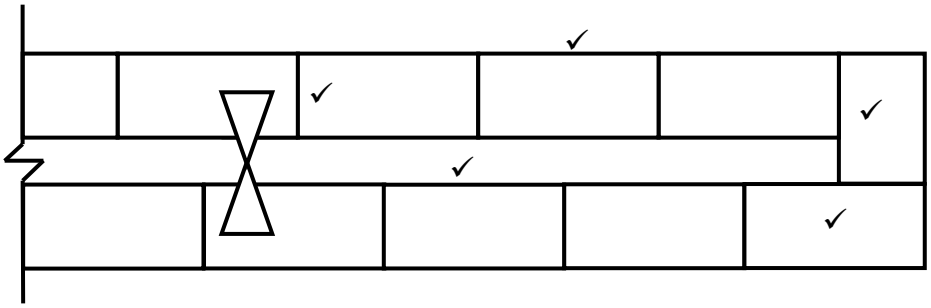
5.4 15 mm to 40 mm ✓ (1)

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.

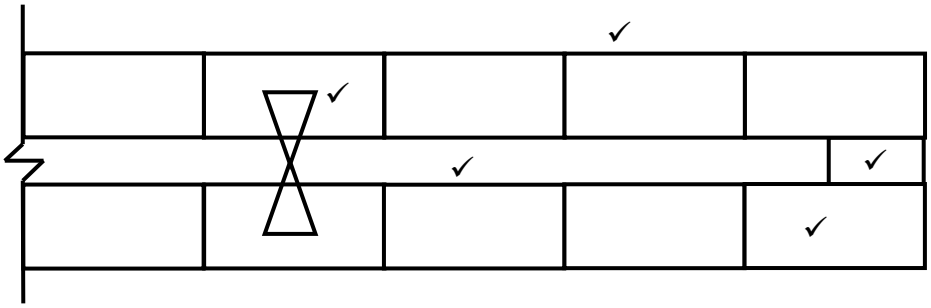
ANY ONE OF THE ABOVE (1)

5.6



Correctness ✓✓

OR

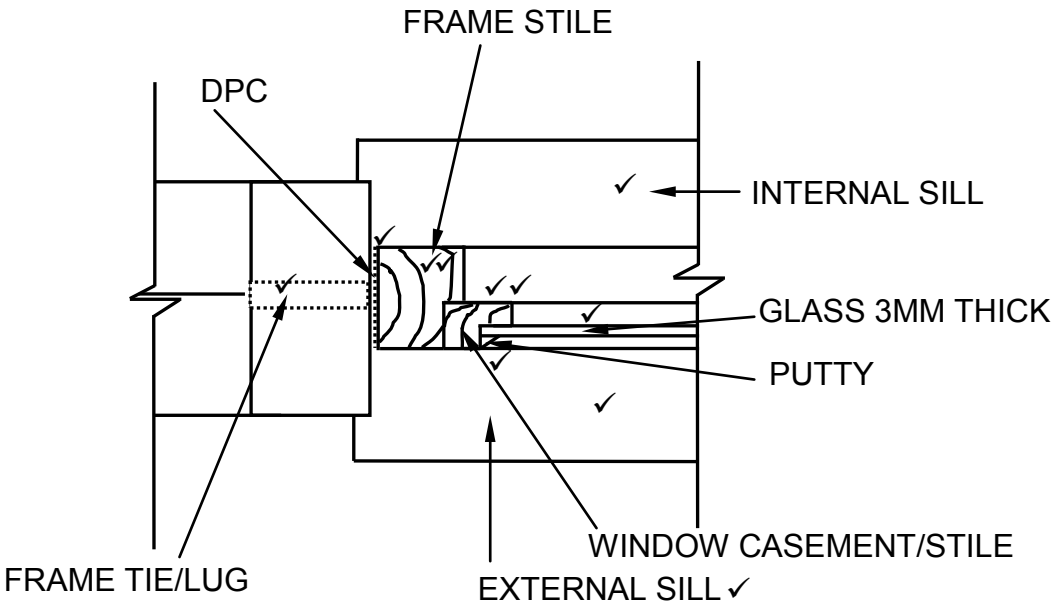


Correctness ✓✓

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



Application of scale 1:5 ✓✓✓

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 construcion activities can only continue after the concrete has set properly.
- Inspect for visible defects.

ANY THREE OF THE ABOVE (3)

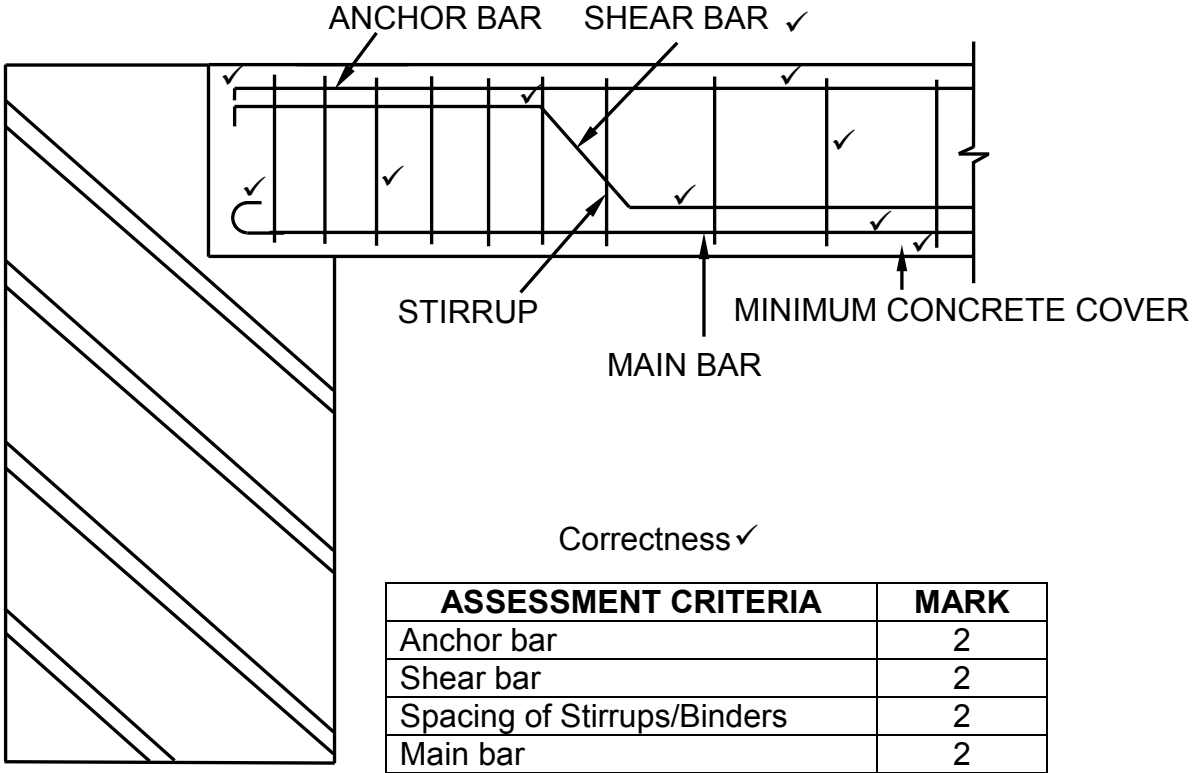
6.5.3 In-situ concrete/Mass concrete/Reinforced concrete ✓ (1)

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/ ✓	8,56 ✓	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:**	
				Internal dimension / Distance between centres + 1 roof truss	
				8 560 mm ✓ / 1 070 mm ✓ + 1 roof truss ✓	
				= 8 + 1 roof truss ✓	
				= 9 roof trusses needed ✓	(5)

[40]

TOTAL: 200