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**GAUTENG PROVINCE**  
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# **JUNE EXAMINATION GRADE 12**

**2025**

## **MARKING GUIDELINES**

**CIVIL TECHNOLOGY:  
CONSTRUCTION**

**19 pages**



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## INSTRUCTIONS FOR THE MARKERS

### 1. Markers should:

- Familiarise themselves thoroughly with the questions and answer before evaluating the responses of candidates.
- Always interpret the responses of the candidates within the context of the question.
- Consider any relevant and acceptable answer during pre-marking but adhere strictly to the answers after finalisation of the marking guidelines.
- There are TWO approaches to answering questions; these are (1) to describe and (2) to explain.
  - If a candidate is required to explain, e.g. a process in 4 steps, only the first 4 responses should be considered.
  - If however a candidate is required to e.g. explain or describe how to transfer heights from one point to another using a transparent pipe level we need to consider that candidates may write a long description, not necessarily well organised, as an intellectual response require. In this case the marker needs to evaluate the complete statement to judge if the candidate explained the required outcome satisfactorily and allocate marks on merit. The marker should apply his/her professional judgement with these types of questions.
- Mark what the candidate wrote and do not award marks for answers that the marker thinks the candidate meant with what was written.
- Indicate the tick or cross right at the position where the mark needs to be awarded or where the candidate made the error.
- Accept the letter corresponding with the correct answer as well as the answer written out in full in multiple-choice questions.
- Accept incorrect spelling in one-word answers unless the spelling changes the meaning of the answer.

### 2. For calculations:

- A mark is only awarded if the correct unit is written next to the answer.
- If TWO marks are awarded, ONE mark is awarded for the answer and ONE mark for the correct unit.
- Where the candidate made a principle error, e.g. added instead of multiplying, no marks will be awarded for the steps. If the answer is correct according to what the candidate did, the mark for the answer can be awarded for the application of skills.
- Where an incorrect answer could be carried over to the next step, the first answer will be deemed incorrect. However, should the incorrect answer be carried over correctly, the marker has to recalculate the values, using the incorrect answer from the first calculation. If correctly used, the candidate should receive the full marks for subsequent calculations.
- Markers should consider when and where a candidate has rounded off in a calculation, as well as the subsequent effect it has on the final answer obtained. The calculation should therefore be awarded marks on merit.





- Alternative methods of calculations must be considered, provided that the correct answer is obtained.

### 3. **When marking drawings:**

- The member for which the mark should be awarded should be drawn correctly in the correct position to receive a mark.
- A member incorrectly drawn but wrongfully repeated in another position will be awarded the mark for the repeated incorrect member provided that the marking guideline provides for TWO or more marks for that member (positive marking).
- Marks can only be awarded for a label if the label correctly indicates the appropriate member.
- Scale drawings should always be marked using an appropriate mask.

### **When a candidate drew the wrong drawing, e.g.:**

- A horizontal section instead of a vertical section, no marks will be allocated to the drawing as the candidate did not respond to the expected outcome.
- An orthographic view instead of sectional view, no marks will be allocated to the drawing as the candidate did not respond to the expected outcome.
- An orthographic view instead of an isometric view, no marks will be allocated to the drawing as the candidate did not respond to the expected outcome.
- If the incorrect drawing was drawn, the candidate can be awarded marks for content that corresponds to what was asked but marks for the correctness of the drawing will not be awarded.



**QUESTION 1: OHS, MATERIALS, TOOLS AND JOINING (GENERIC)**

- 1.1 1.1.1 G ✓ (1)
- 1.1.2 F ✓ (1)
- 1.1.3 B ✓ (1)
- 1.1.4 H ✓ (1)
- 1.1.5 K ✓ (1)
- 1.1.6 N ✓ (1)
- 1.1.7 M ✓ (1)
- 1.1.8 E ✓ (1)
- 1.1.9 C ✓ (1)
- 1.1.10 J ✓ (1)
- 1.2 1.2.1 B ✓ (1)
- 1.2.2 B ✓ (1)
- 1.2.3 C ✓ (1)
- 1.2.4 C ✓ (1)
- 1.2.5 D ✓ (1)
- 1.3 The telescope of a dumpy level / **telescope** (1)
- Determining differences between levels and vertical heights, especially over longer distances ✓
  - Determining levels
  - **Determining slopes**
  - Setting out buildings (1)
  - Transferring levels and heights
- ANY ONE OF THE ABOVE**
- 1.4 • Every plank of a scaffold platform is firmly secured to prevent its displacement ✓
- Every platform is constructed to prevent materials and tools from falling through (1)
- ANY ONE OF THE ABOVE**





1.5 1.5.1

- It prevents workers from falling off the scaffold. ✓
  - To prevent materials from falling off the scaffold.
  - It can be used as a handrail.
  - It is used to strap safety harnesses onto it. (1)
- ANY ONE OF THE ABOVE**

1.5.2

- To prevent materials from falling off the scaffold. ✓
  - To prevent tools from falling off the scaffold.
- ANY ONE OF THE ABOVE** (1)  
[20]

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

NO.	QUESTIONS	ANSWERS	MARKS
1.	Name the drawing depicted in FIGURE B.	Ground floor plan ✓	1
2.	Deduce the scale of the drawing.	1 : 100 ✓	1
3.	Identify number 4.	Finished floor level/FFL ✓	1
4.	Identify number 12.	Earth ✓	1
5.	Identify number 11.	Bath/B ✓	1
6.	Identify number 8.	Sliding Door/Door ✓	1
7.	Identify number 7.	Rainwater downpipe/RWDP /Downpipe/DP ✓	1
8.	Identify number 14.	Distribution board/DB ✓	1
9.	Identify number 5.	Windowsill/Sill ✓	1







10.	Identify the number that indicates the WATT METER in FIGURE B.	Number 13/13 ✓	1
11.	Recommend TWO suitable scales for floor plans other than the one listed in the notes.	1 : 50 ✓ 1 : 200 ✓	2
12.	Give the abbreviations for the following: 12.1 Water closet 12.2 Bath	12.1 WC ✓ 12.2 B ✓	2
13.	Name the feature that must be placed in front of the sliding door as specified in the notes.	Ramp ✓	1
14.	Who checked the drawing?	P. Britz ✓	1
15.	Describe what is indicated by number 3?	Window frame/Casement/Double casement ✓	1
16.	Differentiate between the light installed in the lounge and in the light in the office.	Light in the lounge is a fluorescent light. ✓ Light in the office is a ceiling light. ✓	2
17.	What is the drawing number of the building plan.	557P9 ✓	1
18.	Who must be notified when a contractor sets out levels on a site and there are variances?	Architect/JP Maloi ✓	1
19.	Identify ONE important feature that has been omitted from the plan.	Electrical wiring ✓	1





**MARKING GUIDELINES**
**CIVIL TECHNOLOGY:  
CONSTRUCTION GR12 0625**

20.	What should be installed for balancing and support as you go up the staircase?	Handrail ✓	1														
21.	Deduce the height of window <b>2</b> from the window schedule.	1 200 mm/1,2 m ✓	1														
22.	Draw the symbol for a shower.	 ✓ ✓	2														
23.	Draw the electrical symbol for a wall-mounted light.	 ✓ ✓	1														
24.	Deduce the width of window <b>3</b> from the window schedule.	2 000 mm/2 m ✓	1														
25.	Recommend a suitable floor covering for the bathroom.	Tiles/Vinyl/Concrete/Porcelain/Ceramic/Cork flooring ✓	1														
26.	Explain what is meant by 1 : 10 indicated on the symbol in the notes.	For every 10 metres going across, the ramp goes up by one metre/Slope of the ramp ✓	1														
27.	Identify the type of roof that is used for the building in FIGURE A.	Gable roof ✓	1														
28.	Prove, by means of a control test, that the total vertical dimensions on the left and right of the plan in FIGURE B are equal.	<div>Total vertical measurements:<table><tr><th>Control test left</th><th>Control test right</th></tr><tr><td>220</td><td>220 ✓</td></tr><tr><td>2 000</td><td>2 000 ✓</td></tr><tr><td>110</td><td>110 ✓</td></tr><tr><td>4 000</td><td>4 000 ✓</td></tr><tr><td>220</td><td>220 ✓</td></tr><tr><td>6 550</td><td>= 6 550 ✓</td></tr></table></div> <div>OR</div> <div>Left side: 220 ✓ + 2 000 ✓ + 110 ✓ + 4 000 ✓ + 220 ✓ = 6 550 mm ✓</div> <div>Right side: 220 + 2 000 + 110 + 4 000 + 220 = 6 550 mm ✓</div> <div>Notes: In case an alternative method was used one mark must be given if both totals are the same.</div>	Control test left	Control test right	220	220 ✓	2 000	2 000 ✓	110	110 ✓	4 000	4 000 ✓	220	220 ✓	6 550	= 6 550 ✓	6
Control test left	Control test right																
220	220 ✓																
2 000	2 000 ✓																
110	110 ✓																
4 000	4 000 ✓																
220	220 ✓																
6 550	= 6 550 ✓																







29.	Calculate the area of the bathroom. Show ALL calculations. Give your answer in m <sup>2</sup> . Round off your answer to TWO decimal places.	$= 3\,000\text{ mm} \times 2\,000\text{ mm}$ $= 3\text{ m} \checkmark \times 2\text{ m} \checkmark$ $= 6\text{ m}^2 \checkmark$	3
		<b>TOTAL:</b>	<b>40</b>

**QUESTION 3: QUANTITIES (SPECIFIC)**

3.1.1.

A	B	C	D
			<b><u>CENTRE LINE OF FOUNDATION</u></b>
			$4\,500\text{ mm}/2 \checkmark = 9\,000\text{ mm} \checkmark$
			$9\,500\text{ mm}/2 \checkmark = \underline{19\,000\text{ mm}} \checkmark$
			Centre line = $28\,000\text{ mm} \checkmark$
			Minus $220\text{ mm}/4 \checkmark = 880\text{ mm} \checkmark$
			Total centre line = $27\,120\text{ mm} \checkmark$

(8)

3.1.2

A	B	C	D
			<b><u>AREA REQUIRED FOR TILES:</u></b>
1/	$9,06 \checkmark$		<b>Long wall:</b> $9\,500\text{ mm} - 440\text{ mm} = 9\,060\text{ mm} \checkmark$
	$\underline{4,06} \checkmark$	$36,78\text{ m}^2 \checkmark$	<b>Short wall:</b> $4\,500\text{ mm} - 440\text{ mm} = 4\,060\text{ mm} \checkmark$

(5)

3.1.3.

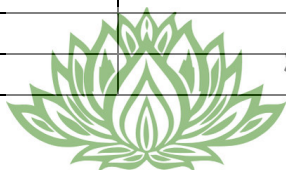
A	B	C	D
			<b><u>5 % FOR BREAKAGE:</u></b>
			$= 5/100 \checkmark \times 36,78\text{ mm} \checkmark$ <b>OR</b> $0,05 \times 36,78\text{ m}^2$
			$= 1,84\text{ m}^2 \checkmark$ / <b>1.839 m<sup>2</sup></b>

(3)

3.1.4.

A	B	C	D
			<b><u>TOTAL AREA FOR TILES REQUIRED:</u></b>
			Area = $36,8\text{ m}^2$
			5 % breakage = $36,8\text{ m}^2 \checkmark + \underline{1,84\text{ m}^2} \checkmark$
			= $38,62\text{ m}^2 \checkmark$
			<b>OR</b>
			Area = $36,8\text{ m}^2$

(3)



			5 % breakage = $36.8 \text{ m}^2 + 1.839 \text{ m}^2$
			= $38.689 \text{ m}^2$

3.2

3.2.1

A	B	C	D
			<b>AREA OF BRICKS REQUIRED</b>
1 / ✓	19,45 ✓		
	<u>0,765</u> ✓	14,88 m <sup>2</sup> ✓	
		<b>Or</b>	
		<b>14.879 m<sup>2</sup></b>	

(4)

3.2.2

A	B	C	D
			<b>NUMBER OF BRICKS REQUIRED</b>
2 / ✓	14,88 ✓		
	<u>50</u> ✓	1 488 bricks ✓	

(4)

3.2.3.

A	B	C	D
			<b>5% FOR WASTAGE:</b>
			= $5 / 100 \checkmark \times 1\,488 \checkmark$ <b>OR</b> $0.05 \times 1\,488$
			= 74,4 bricks ✓

(3)

[30]

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

4.1

4.1.1

Causes of excavation to collapse:

- Heavy rains ✓
- Poor soil strata ✓
- Sides not dug at the correct angle
- Improper use of formwork or shoring to support the walls
- Vibration caused by machinery or heavy vehicles nearby
- Water seeping into the excavated area
- Contact with underground services
- Access to or exit from the excavation
- Soil slides due to cracks or loose soil

**ANY TWO OF THE ABOVE**

(2)

4.1.2

- After heavy rains ✓
- Daily

**ANY ONE OF THE ABOVE**

(1)

4.1.3

- To avoid accidents ✓

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(2)





- To prevent the excavation from collapsing ✓
- To keep workers safe

**Any other acceptable answer**

4.1.4 Services that need to be located:

- Electrical cables ✓
- Water pipes ✓
- Gas lines ✓
- Communication lines
- Storm water systems
- Sewer lines

**ANY THREE OF THE ABOVE**

(3)

4.2 4.2.1 A – Tamping rod/Steel rod ✓  
B – Mould/Cube ✓

(2)

4.2.2 Cube test ✓

(1)

4.2.3 Compressive strength ✓

(1)

- 4.2.4
- 7 days ✓
  - 14 days ✓
  - 28 days

**ANY TWO OF THE ABOVE**

(2)

- 4.3
- Materials must not be stacked directly on the floor. ✓
  - Materials should be stored under cover. ✓
  - Materials should not come into contact with water.
  - Sand and stone should be covered with plastic.
  - Materials should be categorised.
  - Dividing walls should separate sand and stone.
  - Materials should not be stacked higher than three times its width.
  - Stacked material should be linked/or interlinked.
  - Material should only be stored on firm, strong floors.
  - Parts should not protrude.
  - Stacked material should not affect ventilation, lighting or firefighting equipment.
  - Any stack that appears unstable should be restacked.
  - Workers should use ladders or other aids to reach material.

**ANY TWO OF THE ABOVE**

(2)





4.4 Ferrous metal: The main ingredient is iron✓, which gives this metal magnetic properties. It is also high in carbon and is therefore prone to corrosion.

Non-ferrous/metal: Contains little or no iron, ✓ it is corrosion-resistant. **Does not have magnetic properties.** (2)

4.5

- Hazardous material can cause a fire / **chemical spark.** ✓
- Hazardous material can damage other materials. ✓

(2)

4.6

- Sand✓
- Stone/Aggregates✓
- Cement✓

(3)

4.7

- Used to mix the ingredients of concrete. ✓
- Forms a paste that binds the aggregates together. ✓
- It reacts with cement and concrete, strengthening the material.

**ANY TWO OF THE ABOVE** (2)

4.8 600 mm / **1 m / 1 000 mm**✓ (1)

4.9

- A competent person should evaluate the stability of the soil. ✓
- Draw up a safety plan and take sufficient steps to ensure safe working conditions.✓
- The planned trench excavation should be supported by a protective system. ✓
- Safety signs must be displayed.
- Warning lights must be displayed.
- Eliminate any risk and hazards to prevent people from being buried under loose soil or falling objects.
- Erect fencing around the perimeter of the excavation site.
- Excavation should take place under the constant supervision of a qualified person with a confirmed appointment in writing.
- Determine the location of services through inspection.
- Consider weather conditions.

**ANY THREE OF THE ABOVE** (3)





- 4.10
- Sturdy enough to bear the mass of wet concrete without collapsing. ✓
  - Stronger than wood and timber board products. ✓
  - Easy to remove.
  - Not as adaptive as timber and wood.
  - Available in specific sizes and patterns.
  - More expensive than timber or wood.
  - More durable than timber or wood.
  - Reusable.
  - **Tight** along seams and joints so that concrete does not leak to form honeycombs or fins.

**ANY TWO OF THE ABOVE**

(2)

- 4.11
- Filling a slope. ✓
  - Cutting away a slope. ✓
  - Cutting and filling. ✓
  - Excavated soil can be used.

**ANY THREE OF THE ABOVE**

(3)

- 4.12
- Folding wedges/Wedges ✓
  - Walling boards ✓
  - Poling boards ✓
  - Struts

**ANY THREE OF THE ABOVE**

(3)

- 4.13    4.13.1    Portable concrete vibrator / **Concrete vibrator** ✓

(1)

- 4.13.2
- Operate with care and wear appropriate personal protective equipment, e.g., gloves and boots. ✓
  - Inspect controls for proper response before use.
  - Check the condition of the machine at the start and end of every shift.
  - **Report any faults.**
  - Never lay the machine on its side.
  - Never use a faulty machine.
  - Do not allow the vibrating pipe to contact any part of the body.
  - Switch off the machine when it is left unattended.
  - Long use of the machine exposes the operator to vibrations, stop if you feel numbness in your extremities.
  - Switch off the machine and wait for all moving parts to stop before adjusting, repairing, inspecting or cleaning it.

**ANY ONE OF THE ABOVE**

(1)





- 413.3
- Maintain like all machinery- lubricate/ oil and adjust according to the manufacturer's instructions. ✓
  - Clean after use and store in a safe, dry place.
  - Repair or replace damaged electrical cords.
  - Service the concrete vibrator regularly.

**ANY ONE OF THE ABOVE**

(1)  
[40]

**QUESTION 5: JOINING, BRICKWORK AND GRAPHICS AS MEANS OF COMMUNICATION (SPECIFIC)**

5.1 Securing a wall plate to a wall:

- Timber bolted/Rawl bolted to the top of the wall ✓
- Nailed to the wall
- Screwed to the wall
- A galvanised strap/hoop iron nailed or built into a wall
- Tie with roof wire that is built into the wall
- Secure with a tie/strap

**ANY ONE OF THE ABOVE**

(1)

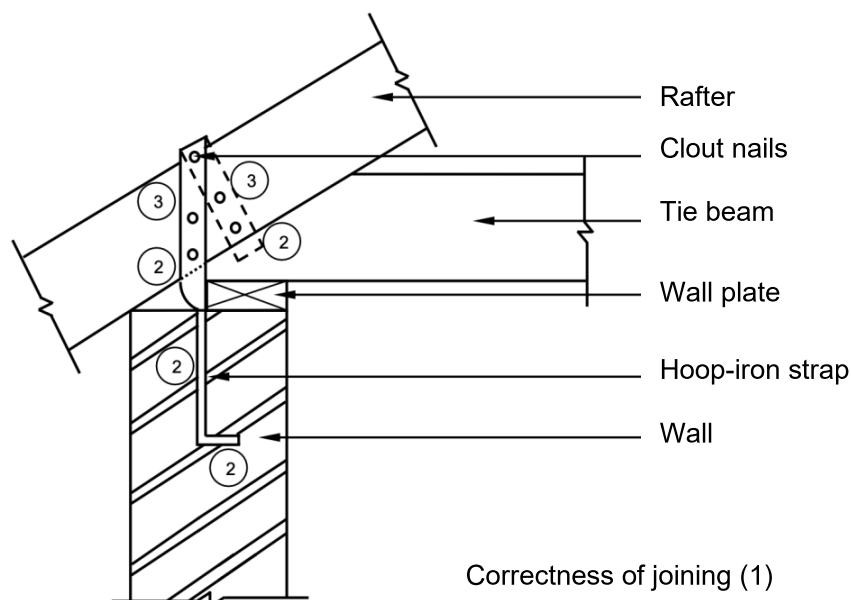
5.2

- 5.2.1
- A – Hexagonal nut ✓
  - B – Square nut/Four-sided nut ✓
  - C – Wing nut/Butterfly nut ✓
  - D – Domed top/Domed nut/Dome nut/Acorn nut/Cap nut ✓

(4)



5.3



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARKS
Correctness of joining	1	
Hoop-iron strap	4	
Clout nails	2	
Any ONE label	1	
<b>TOTAL</b>	<b>8</b>	

(8)

5.4 5.4.1 Herringbone paving pattern ✓

(1)

5.4.2 Construction failure:

- Poorly constructed edge restraint. ✓
- Haunching done incorrectly.
- The structure does not comply with the specifications set out by SANS.
- The concrete haunch is too thin to support itself and cracks or crumbles under pressure.
- There is too little weight to retain the structure and keep the paving in place.
- The bond between the haunch and the edge units is weak and will easily crumble.
- The sub-base is not contained and will be washed out by groundwater.

ANY ONE OF THE ABOVE

(1)





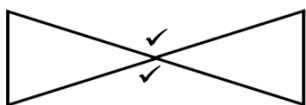
- 5.4.3
- Dry-laid or sand-set✓
  - Bitumen-set
  - Mortar-set

**ANY ONE OF THE ABOVE**

(1)

5.5

Butterfly pattern



Assessment criteria	Mark
Butterfly pattern correct	1
Line drawing correct	1
<b>TOTAL:</b>	<b>2</b>

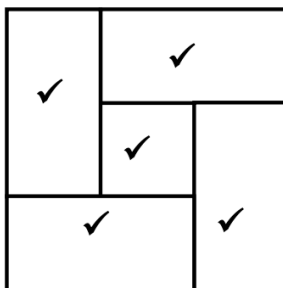
Double triangular pattern



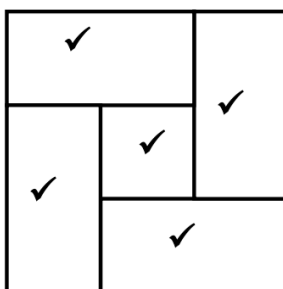
Assessment criteria	Mark
Double triangular pattern correct	1
Line drawing correct	1
<b>TOTAL:</b>	<b>2</b>

(4)

5.6



FIRST COURSE



SECOND COURSE





ASSESSMENT CRITERIA	MARK
Stretcher bond – first course	5
Stretcher bond – second course	5
<b>TOTAL:</b>	<b>10</b>

**[30]**

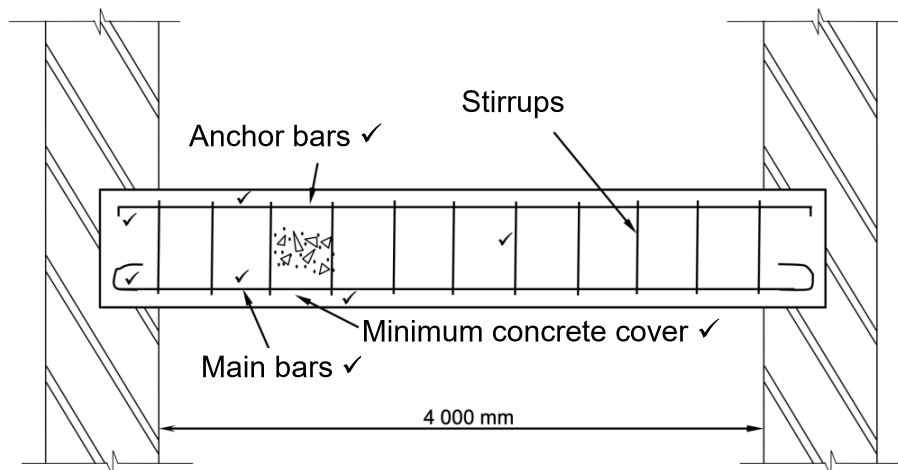
**QUESTION 6: REINFORCEMENT IN CONCRETE, FOUNDATIONS AND  
CONCRETE FLOORS (SPECIFIC)**

- 6.1      6.1.1      A ✓ (1)
- 6.1.2      A ✓ (1)
- 6.1.3      B ✓ (1)
- 6.1.4      D ✓ (1)
- 6.2
- Ground conditions are not stable or solid enough to support ordinary, shallow foundations. ✓
  - Foundation piles distribute the load to more stable ground and can be used as underground or underwater 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, e.g., multi-storey buildings.
  - Where soils are prone to swelling and shrinking according to the moisture content, e.g., clay soil, shallow foundations cannot be used.
  - When the superstructure is exposed to uplifting forces, e.g., offshore platforms, pile foundations are needed.
  - Where soil erosion is possible, piles should be used to carry the load of the superstructure, e.g., for bridges and piers.

**ANY THREE OF THE ABOVE OR ANY OTHER ACCEPTABLE ANSWERS (3)**



6.3



ASSESSMENT CRITERIA	MARK
Anchor bar with 90° bend	2
Stirrups/Binders	1
Main bars with a round bend	2
Any TWO labels (Excluding "Minimum concrete cover")	2
Indicate minimum concrete cover	2
<b>TOTAL:</b>	<b>9</b>

(9)

6.4.1 A – Stirrup ✓

B – Concrete/Concrete symbol ✓

(2)

6.4.2 Minimum cover depth in reinforced concrete is important:

- To protect the steel against corrosion. ✓
- To ensure adequate bonding between the steel and the concrete.
- To ensure adequate protection of the steel in the event of a fire.

**ANY ONE OF THE ABOVE**

(1)

6.4.3 Spacing of bars ✓

(1)

6.4.4 Ribbed bars ensure better bonding with the concrete ✓

**ANY OTHER APPLICABLE ANSWER REFERING TO BETTER BONDING WITH CONCRETE.**

(1)





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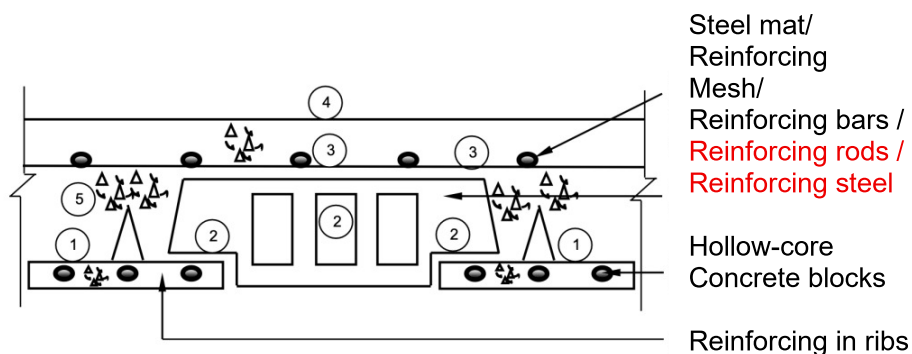
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6.5



ASSESSMENT CRITERIA	MARK
Reinforcing for ribs (inside or outside)	2
Hollow core block (2 x rebate + 1 x front elevation)	3
Reinforcing mesh (1 x side elevation + 1 x front elevation)	2
Finished floor level	1
Concrete symbol correctly indicated	1
Any TWO labels	2
<b>TOTAL:</b>	<b>11</b>

(11)

6.6

6.6.1 Factors to be considered when planning a rib and block

- Unit weight ✓
- Nature of props ✓
- Sound insulation
- Thickness of units
- Pre-stressed units
- Fire resistance
- Construction speed
- Reinforcement properties
- Support and formwork required
- Safety features
- Weight reduction
- Volume reduction
- Precast top layer

**ANY TWO OF THE ABOVE**

(2)





- 6.6.2 Services:
- Electrical services/Conduits ✓
  - Plumbing/Hot water/Cold water/Waste pipes/Sewerage pipes ✓
  - Communication/Telephone/Telecamera ✓
  - Security services/Alarm/Camera
- ANY THREE OF THE ABOVE** (3)
- 6.6.3 220 mm ✓ (1)
- 6.6.4
- Because the units are precast, mechanical handling is required on site. ✓
  - The placing of the blocks between the ribs requires manual labour.
- ANY ONE OF THE ABOVE** (1)
- 6.6.5 After the installation of a rib and block floor:
- Ensure that the correct curing procedure is followed for 7 days to ensure a well-set slab. ✓
  - Allow 28 days for setting of the concrete slab.
  - Temporary props can be removed after the concrete slab has reached a crushing strength of 17 MPa.
- ANY ONE OF THE ABOVE** (1)
- [40]**
- TOTAL: 200**

