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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

CIVIL TECHNOLOGY: CONSTRUCTION

NOVEMBER 2023

MARKING GUIDELINES

MARKS: 200

These marking guidelines consist of 19 pages.

INSTRUCTIONS FOR MARKERS

1. Markers should:

- Familiarise themselves with the question 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 should strictly adhere to the answers after finalisation of the marking guideline.
- There are TWO approaches to answering questions; these are (1) to describe and (2) to explain.
 1. If a candidate is required to explain e.g., a process in 4 steps, only the first 4 responses should be considered.
 2. However, if for example candidate is required to explain or describe a process, we need to consider that that candidates may write a long description, not necessarily well organised. 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.
- Mark what the candidate wrote and do not interpret or predict responses.
- 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 in full in multiple-choice questions or similar questions.
- Accept incorrect spelling in one-word answers unless the spelling changes the meaning of the answer.
- If a learner writes two or more answers separated by a slash (/) mark only the first response, unless the additional answer/s are different names for the same item e.g., Yale lock/Night latch. In this case, the answer for the response should be awarded and the slash (/) should NOT be considered as an additional answer.

2. For calculations:

- A mark is only awarded if the correct unit is written next to the answer. If the question states that the answer must be in a specific unit, a mark will ONLY be awarded if the answer has the correct unit as indicated in the question.
- Marks will only be allocated for the correct values if the candidates add instead of multiply. NO marks will be awarded for the calculations and the answer.
- Where an incorrect answer is correctly carried over, the marker must recalculate the values, using the incorrect answer from the first calculation. If correctly used, the candidate should receive the full marks for subsequent calculations.

- Alternative methods of calculations must be considered, provided that the correct answer is obtained.
- For the calculation of quantities marks will be awarded for the correct use of the dimension paper.

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 provide for TWO or more marks for that member (positive marking).
- Marks can only be awarded for a label if the label is correctly indicating the correct member.
- Scale drawings should always be marked using an appropriate mask.
- If the incorrect/wrong drawing was drawn, the candidate can be awarded for only what was provided for on the marking guideline.
- If a line diagram or an orthographic view instead of a pictorial drawing (isometric/oblique/perspective) is drawn, the first assessment criteria for each member will be marked wrong, but marks will be awarded for the subsequent members if TWO or more marks are awarded for the same member.
- If candidates draw/give more information than what is required, mark strictly according to the assessment criteria.

4. Incorrect numbering of questions:

- If a candidate numbered an incorrectly, but the answer is in the correct position according to the sequence of the questions in the question paper, circle then the incorrect numbering and mark the response.
- If questions were answered randomly not following the same sequence as in the question paper and the learner numbered incorrectly, the response should NOT be marked.

5. Duplication of responses and questions answered in the correct place:

- If a question has been answered twice, mark the first response.
- If a question should be answered on an answer sheet and the candidate answered it on both the answer sheet and in the answer book, mark the response on the answer sheet and cancel the response in the answer book.
- If the question has been answered in the answer book instead of on the answer sheet, mark the response in the answer book according to the assessment criteria on the marking guideline.



QUESTION 1: OHS&A, MATERIALS, TOOLS, EQUIPMENT AND JOINING (GENERIC)

- | | | | |
|-------|--------|---|-----|
| 1.1 | 1.1.1 | B ✓ | (1) |
| | 1.1.2 | B ✓ | (1) |
| | 1.1.3 | D ✓ | (1) |
| | 1.1.4 | D ✓ | (1) |
| | 1.1.5 | C ✓ | (1) |
| | 1.1.6 | C ✓ | (1) |
| | 1.1.7 | A ✓ | (1) |
| | 1.1.8 | A ✓ | (1) |
| | 1.1.9 | D ✓ | (1) |
| | 1.1.10 | C ✓ | (1) |
| | 1.1.11 | B ✓ | (1) |
| | 1.1.12 | A ✓ | (1) |
| 1.2.1 | 1.2.1 | Rawlbolt/Coach screw with a plug/Threaded rod/Bolt and nut/Plastic plug with a screw ✓ | (1) |
| | 1.2.2 | Raw bolts/Coach screw with a plug /Threaded rod/Bolt and nut/
Plastic plug with a screw: <ul style="list-style-type: none"> • Are strong fasteners ✓ • Resist pull out failure ✓ • Have excellent mechanical properties • Have excellent carrying capacity/Ability/Carry heavy weight • Are suitable for tensile strength and yield stress • Are suitable for variance of hole sizes ANY TWO OF THE ABOVE | (2) |

- 1.2.3
- Drill holes into the pier and remove the debris. ✓
 - Remove bolts and washers and insert shields into holes. ✓
 - Insert bolts with washers through the hinges and tighten. ✓
- OR**
- Drill holes into the pier and remove the debris.
 - Insert plastic plugs into the holes.
 - Insert rawl bolts/coach screws with plugs/threaded rods/bolts /plastic plugs with screws through the hinges and tighten.
- OR**
- Drill holes through the pier and remove the debris.
 - Insert the threaded rod/bolt into the hole and add the nuts.
 - Tighten the nuts. (3)
- 1.3
- The circuit board of the laser level can be damaged. ✓
 - Moisture can damage the laser level.
 - The laser level might not function properly.
- ANY ONE OF THE ABOVE (1)**
- 1.4
- Perform regular collimation tests on the dumpy level. ✓
 - Calibrate the dumpy level instrument regularly.
- ANY ONE OF THE ABOVE (1)**
- [20]**

QUESTION 2: GRAPHICS AS MEANS OF COMMUNICATION (GENERIC)

NO.	QUESTIONS	ANSWERS	MARKS
1.	Give ONE reason why FIGURE B represents the first floor plan.	Window next to sliding door/patio door on balcony/Staircase arrows pointing upwards/Arrows on staircase ✓	1
2.	Name the SI unit that is used to indicate dimensions on building plans.	Millimetre/mm ✓	1
3.	Identify number 1.	Sliding door/Patio door ✓	1
4.	Identify the number indicating the emergency exit.	2 ✓	1
5.	What is the purpose of number 3?	To support the handrails/To fill the spaces between the posts/For aesthetic purposes/To prevent people from falling off the balcony/For safety purposes ✓	1
6.	Identify number 4.	Window sill/Sill ✓	1
7.	Identify number 5.	Gutter ✓	1
8.	Identify number 6.	Downpipe/Rainwater pipe/Rainwater downpipe/RWDP ✓	1
9.	Identify number 7.	Balcony/Cantilever balcony/Balcony slab /Concrete slab ✓	1
10.	Deduce from the window schedule the dimensions of the window that is installed at number 8.	900 mm ✓ x 600 mm ✓ OR 0,9 m x 0,6 m	2
11.	Who is the owner of the new dwelling?	Mr Ntombi ✓	1
12.	Name the elevation where the sink is located.	East elevation/East ✓	1
13.	Identify the safety error in FIGURE A.	No balusters/rails/Safety rails on balcony ✓	1
14.	Deduce from the building plan why it was not approved after the first submission.	Drawing of internal staircase/ Internal staircase was omitted ✓	1

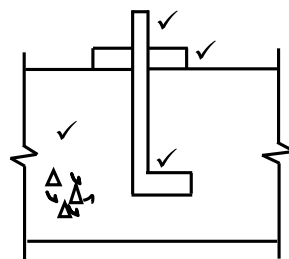
15.	Name the material that must be used for the balusters.	Aluminium ✓	1
16.	Deduce from the notes column the type of roof illustrated in FIGURE A.	Lean-to-roof ✓	1
17.	How many signatures must be indicated on this building plan?	2 ✓	1
18.	What are the dimensions for the balusters as indicated by the architect?	Ø 50 mm ✓ x 1 200 mm ✓	2
19.	Name the material that must be used for the final finishing of the outside wall.	Plaster and paint/Plaster/Paint ✓	1
20.	Describe the end shape of the balustrades.	Round/Circular/Circle/Cylindrical ✓	1
21.	How many hinged openings are indicated on Window 1 in the window schedule?	3 ✓	1
22.	Draw the symbol for finished wood for the boardroom table.		2
23.	Draw the electrical symbol for a three-pole one-way switch.		2
24.	How many fluorescent tubes are indicated in the office?	2 ✓	1

25.	Calculate the total height of the wall on the left side of the building from the finished floor level. Give your answer in meter.	$2,955 \checkmark + 2,955 \checkmark + 3,0 \checkmark$ $= 8,91 \checkmark \text{ m}$ <p>OR</p> $2\ 955 + 2\ 955 + 3\ 000$ $= 8,91 \text{ m}$	4
26.	Calculate the area of the exterior wall on the ground floor, that will consist of bricks, from the finished floor level to the top of the floor slab in the south elevation in FIGURE A. Show ALL calculations.	$(2,955 \checkmark \times 8,0 \checkmark) - (2,4 \checkmark \times 1,2 \checkmark)$ $= 23,64 \checkmark - 2,88 \checkmark$ $= 20,76 \checkmark \text{ m}^2 \checkmark$ <p>OR</p> $(2\ 955 \times 8\ 000) - (2\ 400 \times 1\ 200)$ $= 23\ 640\ 000 - 2\ 880\ 000$ $= 20\ 760\ 000 \text{ mm}^2$	8
		TOTAL:	40



QUESTION 3: ROOFS, STAIRCASES AND JOINING (SPECIFIC)

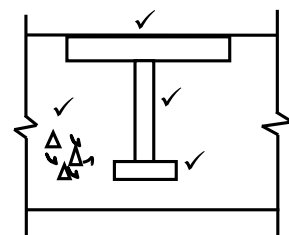
3.1 3.1.1



L-BOLT

(4)

3.1.2



WELDED HEADED STUD

(4)

- 3.2 3.2.1 A – Hand rail ✓
 B – Pitch line ✓
 C – Rise/Riser ✓

(3)

- 3.2.2 Stairwell:
 Open space between flights of stairs ✓

(1)

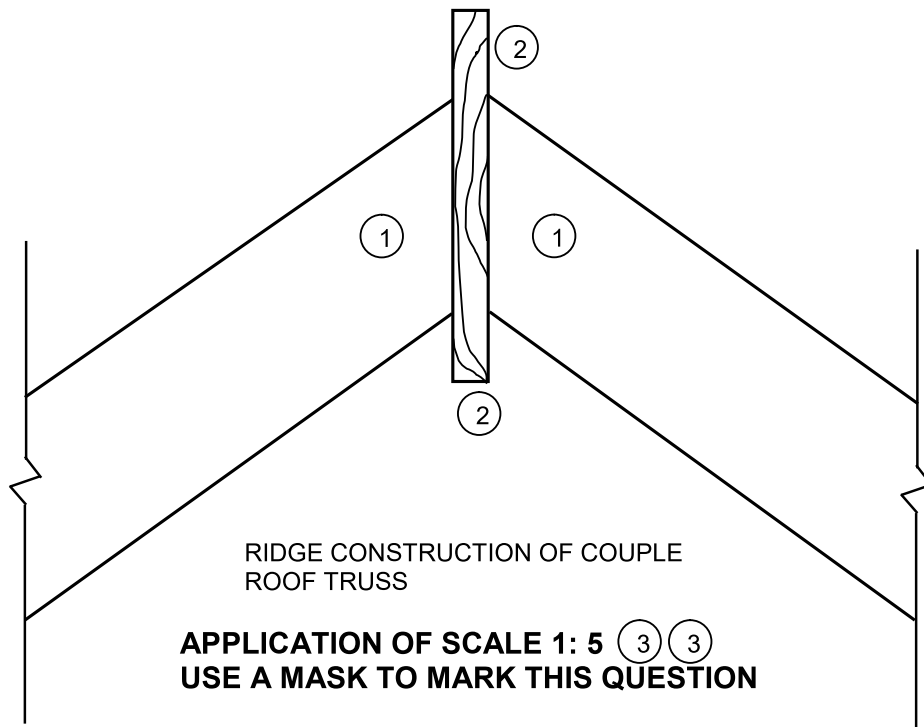
- 3.3 Concrete roof tiles: Are very heavy/bigger loads ✓
 Corrugated iron roof sheeting: Are lighter/smaller loads ✓

(2)

- 3.4 Maximum span:
 • Couple roof: 3 m ✓
 • Closed couple roof: 4 m ✓
 OR
 • Couple roof: Shorter than a closed couple roof
 • Closed couple roof: Longer than a couple roof

(2)

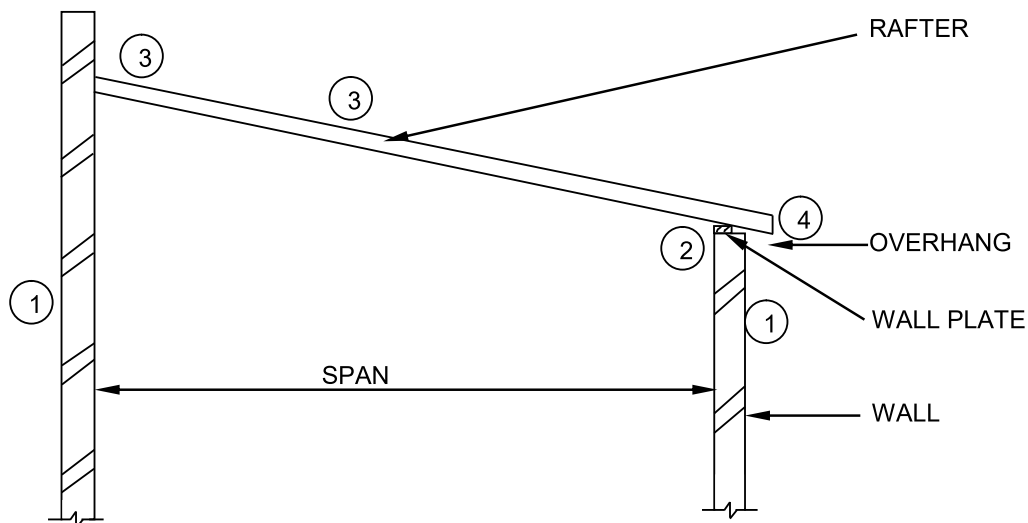
3.5



NO.	ASSESSMENT CRITERIA	MARK
1	Rafters	2
2	Ridge beam	2
3	Application of scale: All correct = 2 ONE incorrect = 1 TWO and more incorrect = 0	2
TOTAL:		6

(6)

3.6



APPLICATION OF SCALE: 1 : 50 (5) (5)
USE A MASK TO MARK THIS QUESTION

NO.	ASSESSMENT CRITERIA	MARK
1	Walls	2
2	Wall plate	1
3	Rafter (1 x rafter + 1 x correct placement)	2
4	Overhang	1
5	Application of scale: All correct = 2 ONE incorrect = 1 TWO and more incorrect = 0	2
TOTAL:		8

(8)
[30]

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

- 4.1 4.1.1 feet/hands ✓ (1)
- 4.1.2 controls ✓ (1)
- 4.1.3 Dry ✓ (1)
- 4.1.4 portable concrete vibrator/concrete vibrator ✓ (1)
- 4.1.5 Petrol/Diesel/Gasoline/Fuel/Electrical ✓ (1)
- 4.2 4.2.1 Shallow trenches/Loose soil/Unstable soil ✓ (1)
- 4.2.2 A: Polling board ✓
B: Walling board ✓
C: Strut ✓ (3)
- 4.2.3 Folding wedges/Wedges/Wedge ✓ (1)
- 4.2.4 Consequences if the strut is not properly secured:
 - The excavation may collapse ✓
 - Work can be delayed ✓
 - Workers can be injured**ANY TWO OF THE ABOVE** (2)
- 4.2.5 Timber must be of:
 - Good quality ✓
 - Adequate strength
 - Water resistant**ANY ONE OF THE ABOVE** (1)
- 4.3 4.3.1 To quickly mix concrete ✓ (1)
- 4.3.2 Store machine with opening facing downwards:
 - To prevent water from remaining in the drum ✓
 - To prevent the drum from rusting ✓ (2)
- 4.4 4.4.1 Tamping rammer/Rammer ✓ (1)
- 4.4.2 Plate compacter ✓ (1)
- 4.4.3 Power trowel float/Power float ✓ (1)

4.5 4.5.1 Fibre glass linings provide a very smooth finish to concrete. ✓

4.5.2 Advantage when using fibre glass linings:

- Easy to remove when concrete has set ✓
- Can be used repeatedly
- Does not break easily
- Easy to handle

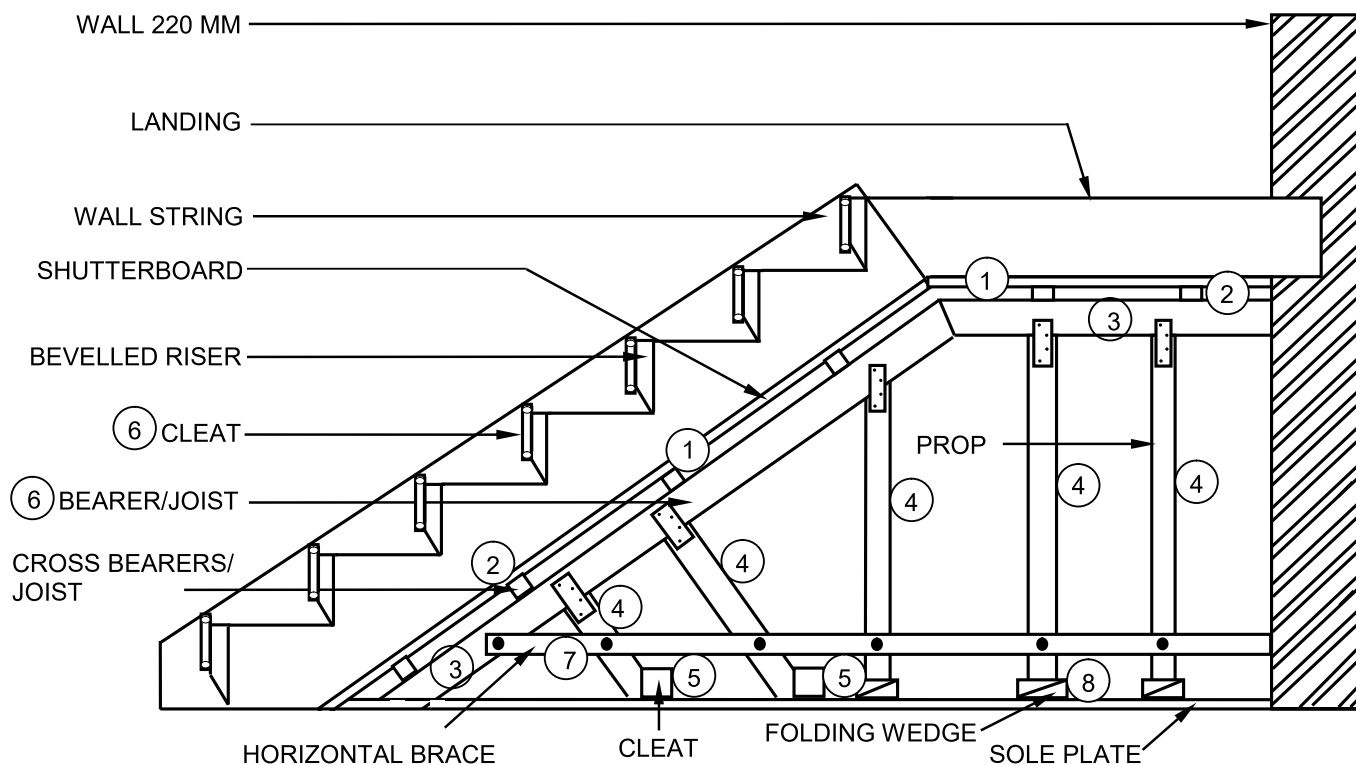
ANY ONE OF THE ABOVE (1)

4.6 Defects that occur when seams and joints are not water tight:

- Honey combs ✓
- Fins ✓

(2)

4.7



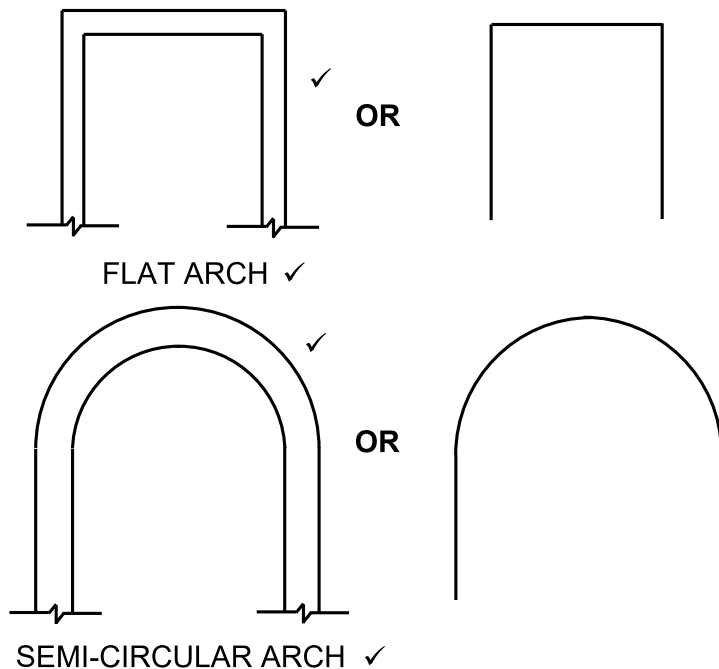
NO.	ASSESSMENT CRITERIA	MARK
1	Shutter board (1 x stairs + 1 x landing)	2
2	Cross bearers/Joist (1 x stairs + 1 x landing)	2
3	Bearer/Joist (1 x stairs + 1 x landing)	2
4	Props (3 x stairs + 2 x landing)	5
5	Cleats	2
6	Any TWO labels	2
7	Horizontal brace	1
8	Folding wedges (ANY ONE)	1
TOTAL:		17

(17)
[40]

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

- 5.1 5.1.1 Straight edge/Straight plank ✓ (1)
- 5.1.2
- Worker is pulling the straight edge/tool over the plastered surface ✓
 - Worker is using the straight edge.
- ANY ONE OF THE ABOVE** (1)
- 5.1.3 2 wheelbarrows/1½ wheelbarrows ✓ (1)
- 5.2 Water is added to a screed mixture to:
- Activate a chemical reaction/Hydration/Start the hydration process ✓
 - Achieve a plastic mixture ✓
 - Make the mixture workable
- ANY TWO OF THE ABOVE** (2)
- 5.3 5.3.1 The monolithic screed can be applied when fresh concrete:
- Has stopped bleeding ✓
 - Has set to a firm surface
- ANY ONE OF THE ABOVE** (1)
- 5.3.2 Preparing concrete to receive monolithic screed:
- Roughen the concrete base with a wire or nylon brush ✓
 - Remove all rubble from the concrete base ✓
- (2)
- 5.4 Beam filling refers to the brickwork to fill spaces between roof trusses ✓, wall plates and the roof covering. ✓ (2)
- 5.5 Height of beam filling:
- From wall plate to the roof sheet ✓
 - Must be the same height as the top of the roof batten to fill the spaces between the roof trusses
- ANY ONE OF THE ABOVE** (1)

5.6 **THE MARK FOR THE LABEL WILL ONLY BE AWARDED IF THE ARCH IS CORRECT**

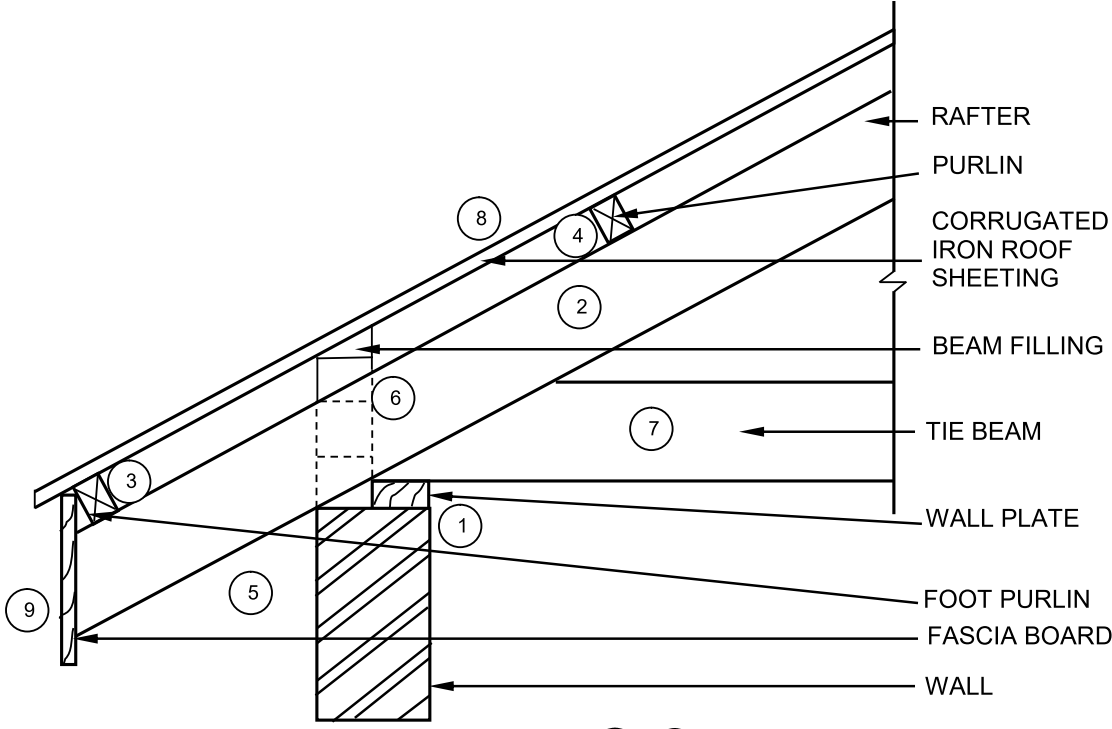


(4)

- 5.7 5.7.1 Shape of bricks:
 Gauged arch – Purposely made wedge shaped bricks is used ✓
 Rough arch – Normal rectangular bricks are used ✓ (2)

- 5.7.2 Shape of mortar joints:
 Gauged arch – Mortar joints are rectangular/parallel ✓
 Rough arch – Mortar joints are wedge/triangular shaped ✓ (2)

5.8



APPLICATION OF SCALE: 1 : 10 (10) (10)
USE A MASK TO MARK THIS QUESTION
FOOT PURLIN AT THE END OF RAFTER

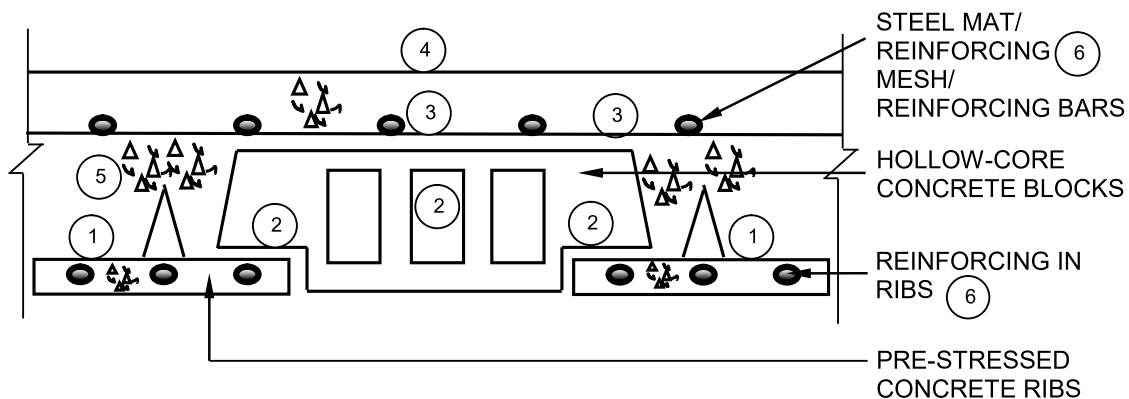
NO.	ASSESSMENT CRITERIA	MARK
1	Wall plate	1
2	Rafter	1
3	Foot purlin (placed at the end of the rafter)	1
4	Purlin	1
5	Overhang	1
6	Beam filling	1
7	Tie beam	1
8	Roof covering	1
9	Fascia board	1
10	Application of scale: All correct = 2 ONE incorrect = 1 TWO and more incorrect = 0	2
TOTAL:		11

(11)
[30]

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

- | | | | |
|-----|-------|--|-----|
| 6.1 | 6.1.1 | C ✓ | (1) |
| | 6.1.2 | F ✓ | (1) |
| | 6.1.3 | D ✓ | (1) |
| | 6.1.4 | E ✓ | (1) |
| | 6.1.5 | A ✓ | (1) |
| 6.2 | 6.2.1 | A – Crosswise method ✓
B – Hair knot method ✓ | (2) |
| | 6.2.2 | Ribbed bar/Twisted ribbed bar ✓ | (1) |
| | 6.2.3 | Spacers used in reinforcing:
<ul style="list-style-type: none"> • Concrete blocks ✓ • Steel stands ✓ • Plastic spacers ANY TWO OF THE ABOVE | (2) |
| | 6.2.4 | Purpose of spacers:
<ul style="list-style-type: none"> • To keep the reinforcing steel away from the formwork/hollow blocks ✓ • To ensure that the required minimum concrete cover is obtained during the pouring of the concrete ✓ | (2) |
| | 6.2.5 | <ul style="list-style-type: none"> • Mild steel/Soft steel ✓ • High carbon steel • Tensile steel ANY ONE OF THE ABOVE | (1) |

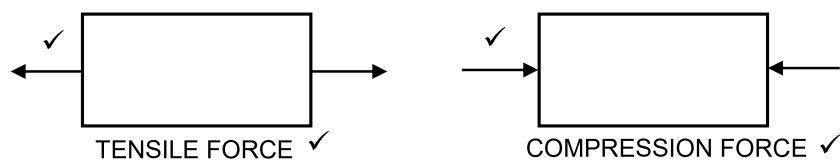
6.3



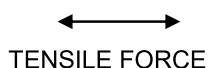
NO.	ASSESSMENT CRITERIA	MARK
1	Reinforcing for ribs (inside or outside)	2
2	Hollow core block (2 x rebate + 1 x hole)	3
3	Reinforcing mesh (1 x side elevation + 1 x front elevation)	2
4	Finished floor level	1
5	Concrete symbol correctly indicated	1
6	Any TWO Labels	2
TOTAL:		11

(11)

6.4 THE MARK FOR THE LABEL WILL ONLY BE AWARDED IF THE FORCE IS CORRECT



OR



(4)

6.5	A	B	C	D	
				Volume of hardcore filling	
				$9\,250 - 2/220 \checkmark = 8\,810 \checkmark$	
6.5.1				$5\,220 - 2/220 \checkmark = 4\,780 \checkmark$	
	1/	8,81 ✓			
		4,78 ✓			
		0,17 ✓			
			7,16 m ³ ✓	7,16 m ³ hardcore filling needed	(8)
	1/	8,81 ✓			
		4,78 ✓			
6.5.2			42,11 m ² ✓	Damp-proof membrane needed	(3)
				Correct use of dimension paper ✓	(1)
					[40]
					TOTAL: 200