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Basic Education
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SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS

CIVIL TECHNOLOGY: CONSTRUCTION

2022

MARKING GUIDELINES

MARKS: 200

This marking guideline consists of 17 pages.

INSTRUCTIONS FOR THE 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.
 - If a candidate is required to explain, e.g. a process in 4 steps, only the first 4 responses should be considered.
 - However, if for example a candidate is required to 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 may do. 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 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 principal 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 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.

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 for only what was asked but mark/s for the correctness of the drawing will not be awarded e.g., if a King Post roof truss was asked in the question, and candidate drew SA-Howe Truss

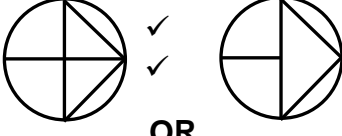
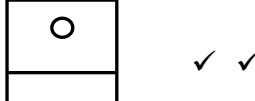
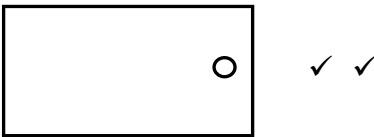

QUESTION 1: OHS, MATERIALS, TOOLS, EQUIPMENT AND JOINING (GENERIC)

- 1.1 1.1.1 Thermo plastic/Thermo plastic powder coating ✓ (1)
- 1.1.2 Electroplating ✓ (1)
- 1.1.3 Curing ✓ (1)
- 1.1.4 Paint/Varnish ✓ (1)
- 1.1.5 Galvanising ✓ (1)
- 1.2 1.2.1 Non-skid material should be fitted to:
 • Prevent ladders from moving when workers are using them ✓
 • Ensure stability of the ladder when in use
ANY ONE OF THE ABOVE (1)
- 1.2.2 Wooden ladders are better:
 • To prevent electrical shock ✓
 • Because it is a poor conductor of electricity
ANY ONE OF THE ABOVE (1)
- 1.2.3 Aluminium ladder is:
 • Lighter ✓
 • More durable
 • Easier to handle
 • Easy to clean
 • Stronger
 • Suitable to extend to higher heights
ANY ONE OF THE ABOVE (1)
- 1.2.4 Wooden ladders can be treated with:
 • Linseed Oil/Oil ✓
 • Clear varnish/Varnish ✓
 • Wood preservative/Preservative
ANY TWO OF THE ABOVE (2)
- 1.3 The scaffold platform:
 • Must have guard rails ✓
 • Must have toe boards ✓
 • Should have sufficient room between the structure and the platform for the worker to sit and work
 • Must be free of any obstruction/waste/projecting nails/equipment that can cause injury
 • Must be non-slip
 • Should not be filled with unnecessary equipment/Overloaded
ANY TWO OF THE ABOVE (2)

- 1.4 A safety net can be erected:
- Above an entrance ✓
 - At passageways ✓
 - At areas where persons work while work is being performed above them
 - To prevent falling objects from injuring workers
- ANY TWO OF THE ABOVE** (2)
- 1.5 1.5.1 Rawlbolt/Expansion bolt/Anchor bolt ✓ (1)
- 1.5.2
- Drill hole ✓
 - Remove debris/Clean the hole ✓
 - Remove the bolt and washer/insert the shield ✓
- (3)
- 1.6 Dumpy level determines:
- Levels and heights ✓
 - Differences between levels and vertical heights
 - Levels and slopes
 - Distances
- ANY ONE OF THE ABOVE** (1)
- Protect the dumpy level by:
- Placing the telescope in its case directly after use ✓
 - Not bumping the instrument against objects
 - Not dropping the instrument
 - Performing the collimation test regularly to ensure accuracy
 - Keeping it dry
- ANY ONE OF THE ABOVE** (1)
- [20]**

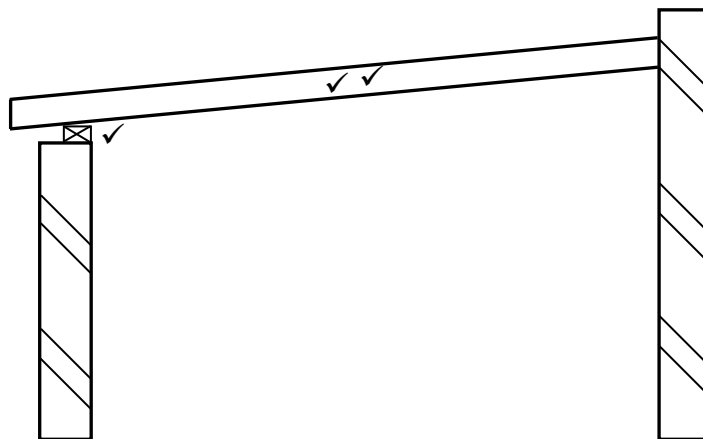
QUESTION 2: GRAPHICS AS MEANS OF COMMUNICATION (GENERIC)**ANSWER SHEET 2**

NO.	QUESTIONS	ANSWERS	MARKS
1	Identify the scale that was used for the site plan and the floor plan respectively.	1:500 ✓ 1:100 ✓	2
2	Who is responsible for checking the building plan?	C. Lee ✓	1
3	What type of fencing does the architect recommend for the new dwelling?	Precast concrete fencing ✓	1
4	Name the town where the new dwelling will be erected.	Jeffreys Bay ✓	1
5	What was done as revision 1?	Window in room A ✓	1
6	Identify number 1.	Municipal sewer line/Sewer line ✓	1
7	Identify number 3 by giving the abbreviation.	MH ✓	1
8	Identify number 4.	New dwelling ✓	1
9	Identify number 5.	Earth ✓	1
10	Identify number 9.	Distribution board/DB ✓	1
11	Identify number 11.	One-way switch-double pole ✓	1
12	Identify number 12.	Sink unit-single/Single bowl sink/Sink ✓	1
13	Identify the number that indicates the boundary line.	8 ✓	1
14	Describe the purpose of number 2.	For pedestrians/Area dedicated for walking ✓	1
15	Deduce the plot number of the existing dwelling from FIGURE A.	Plot 73 ✓	1
16	What is omitted in Maple Street with reference to number 6?	Municipal connection/Municipal manhole ✓	1

17	What leisure feature is located on the site plan?	Swimming pool ✓	1
18	Draw the north symbol to show that the driveway side is facing east.	 Direction ✓	3
19	What is the purpose of the north symbol on a house plan?	To indicate the direction/ elevation ✓	1
20	Which feature indicates that this is a double storey building?	Staircase/Stairs ✓	1
21	Deduce THREE faults from bedroom 2.	Dimension incorrectly indicated as 110 mm of outside wall ✓ No electrical connection from light switch to the light fitting/ ✓ No wiring ✓ Window symbol incorrect	3
22	Draw the symbol for a wash tub.		2
23	Draw the symbol for a bath.		2
24	Draw the symbol for a water meter.		2
25	Describe TWO reasons why the local municipality would not approve FIGURE A.	<ul style="list-style-type: none"> • Omitted dimensions/ Measurements ✓ • No levels/heights/invert levels/corner heights indicated ✓ • Impossible to position new dwelling • No north symbol • Incomplete sewage layout • No contour lines indicated 	2
26	Calculate the length of the house. Give your answer in m. Show all calculations.	$\begin{array}{r} \overbrace{4\ 000 + 5\ 000}^{\checkmark} + \overbrace{4\ 000 + 4\ 000}^{\checkmark} \\ \overbrace{+ 220 + 220}^{\checkmark} + \overbrace{+ 110 + 110 + 110}^{\checkmark} \\ = 17\ 770 \checkmark \\ = 17,77 \checkmark \text{ m} \end{array}$	6
TOTAL:			40

QUESTION 3: ROOFS, STAIRCASES AND JOINING (SPECIFIC)

- 3.1 3.1.1 Bolted ✓ (1)
- 3.1.2 J-bolt ✓ (1)
- 3.1.3 7 metres ✓ (1)
- 3.1.4 50 mm x 76 mm ✓ (1)
- 3.1.5 760 mm ✓ (1)
- 3.2 The margin is the distance between the top of the string and the pitch line ✓ that is measured at 90° to the pitch line. ✓ (2)
- 3.3 A pitch board is a template, ✓ made from plywood or other board products, used to set out a staircase. ✓ (2)
- 3.4 A. Landing ✓
 B. Baluster ✓
 C. Tread/Going ✓ (3)
- 3.5 3.5.1 No wall plate ✓ – Will not be able to tie/fasten the Rafter to the wall plate/Rafter might fall from wall. ✓
 Rafter does not have a slope - Water will not be able to flow down from roof/Roof will collapse due to rainwater not flowing away. (2)
- 3.5.2

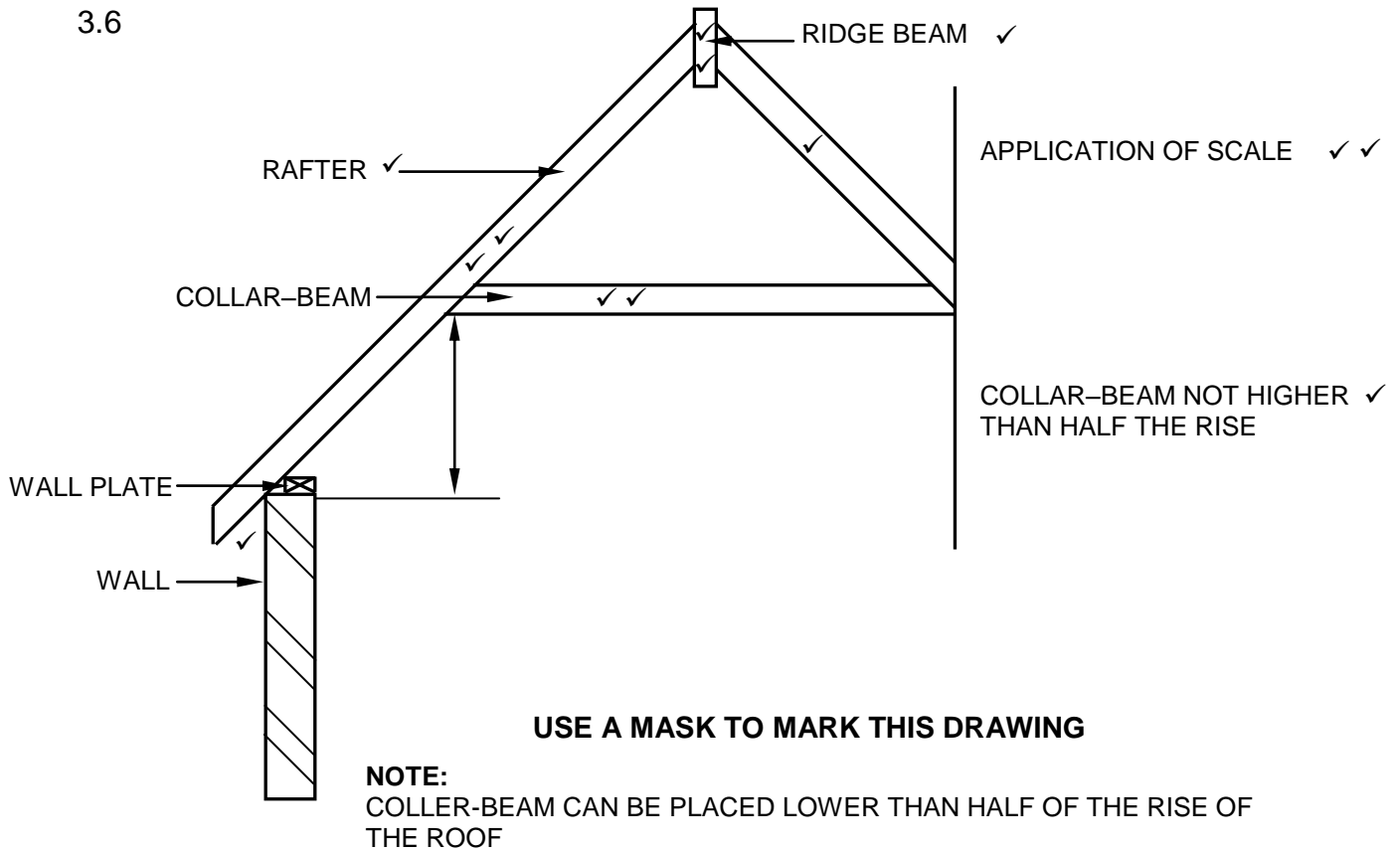


NOTE: IF A LINE DIAGRAM WAS DRAWN ONE MARK WILL BE ALLOCATED FOR THE SLOPE

ASSESSMENT CRITERIA	MARK
Wall plate	1
Rafter with a slope	2
TOTAL	3

(3)

3.6



ASSESSMENT CRITERIA	MARK
Correctness of drawing:	
Collar beam	2
Rafters	3
Ridge beam	2
Overhang	1
Collar beam not higher than half the rise of truss	1
Any TWO labels	2
Application of scale:	
ONE or TWO incorrect = 2	
THREE or FOUR incorrect = 1	
More than FIVE incorrect = 0	2
TOTAL:	13

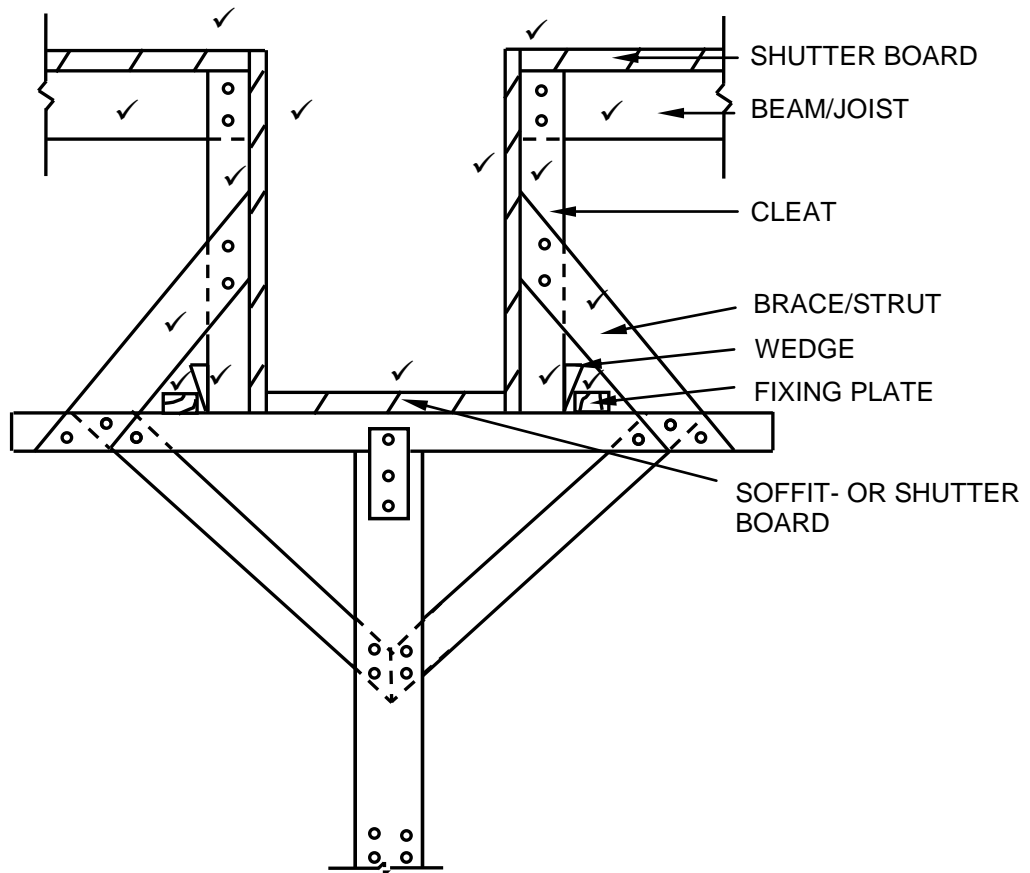
(13)
[30]

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

- 4.1 4.1.1 I ✓ (1)
- 4.1.2 H ✓ (1)
- 4.1.3 G ✓ (1)
- 4.1.4 F ✓ (1)
- 4.1.5 D ✓ (1)
- 4.1.6 C ✓ (1)
- 4.1.7 A ✓ (1)
- 4.1.8 K ✓ (1)
- 4.2 600 mm ✓ (1)
- 4.3 Safety factors before excavations begin:
- A competent person should evaluate the stability of the ground ✓
 - 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 risks and hazards to prevent people from being buried under loose ground or falling objects
 - Erect fencing around the perimeter of the excavation site
 - Excavations should take place under the constant supervision of a qualified person with appointment confirmed in writing
 - Determine the location of services through inspection
 - Consider the weather conditions
- ANY THREE OF THE ABOVE** (3)
- 4.4 Steel shuttering is:
- Sturdy enough to bear the mass of wet concrete without collapsing ✓
 - Stronger than wood and timber board products ✓
 - Easy to remove when concrete has set
 - Not as adaptive as timber shuttering
 - Only available in specific sizes and patterns
 - More expensive than timber shuttering
 - More durable than timber shuttering
 - Reusable
 - Tight along seams and joints so that concrete does not leak to form honeycombs or fins
- ANY TWO OF THE ABOVE** (2)

- 4.5 Levelling a site:
- Filling a slope ✓
 - Cutting away a slope ✓
 - Cutting and filling ✓
 - Excavated soil can be used
- ANY THREE OF THE ABOVE** (3)
- 4.6 Components of shuttering:
- Folding wedges/Wedges ✓
 - Walling boards ✓
 - Poling boards ✓
 - Struts
- ANY THREE OF THE ABOVE** (3)
- 4.7 Block board is:
- Lightweight ✓
 - Easy to work with, using ordinary woodwork tools
 - Not prone to warping
 - Suitable for indoor and outdoor use
 - Excellent ability to hold nails and screws
- ANY ONE OF THE ABOVE** (1)
- 4.8 4.8.1 Tamping rammer ✓ (1)
- 4.8.2 Safe handling regarding your hands and feet:
- Do not place your hands/feet near the moving parts ✓
 - Use both hands to operate the machine ✓
 - Ensure a well-balanced stance
 - Wear appropriate PPE/Wear gloves/Wear boots
- ANY TWO OF THE ABOVE** (2)
- 4.8.3
- To prevent the machine from rusting/not working effectively ✓
 - So that the machine lasts longer
- ANY ONE OF THE ABOVE** (1)

4.9



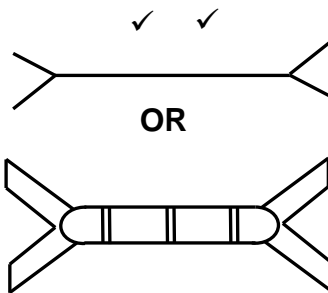
ASSESSMENT CRITERIA	MARK
Correctness of drawing:	
Shutter boards	2
Shutter board sides	2
Soffit/Shutter board	1
Beams/Joists	2
Cleats	2
Braces/Struts	2
Wedges	2
Fixing plates	2
TOTAL:	15

(15)
[40]

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

- 5.1 Wet the wall ✓ (1)
- 5.2 Water will make the mixture workable ✓ (1)
- 5.3 1:3 ✓ (cement; sand) (1)
- 5.4 Splatter dash finish/Splatter finish ✓ (1)
- 5.5 Types of screeds:
 - Dry screed ✓
 - Monolithic screed ✓
 - Bonded screed**ANY TWO OF THE ABOVE** (2)
- 5.6 Water-reducing agent ✓ (1)
- 5.7 5.7.1 The cavity will:
 - Ensure that no water will penetrate the inner wall ✓
 - Provide insulation against heat/sound/cold ✓
 (2)

5.7.2



NYLON WALL TIE

ASSESSMENT CRITERIA	MARK
Correctness of drawing:	2

(2)



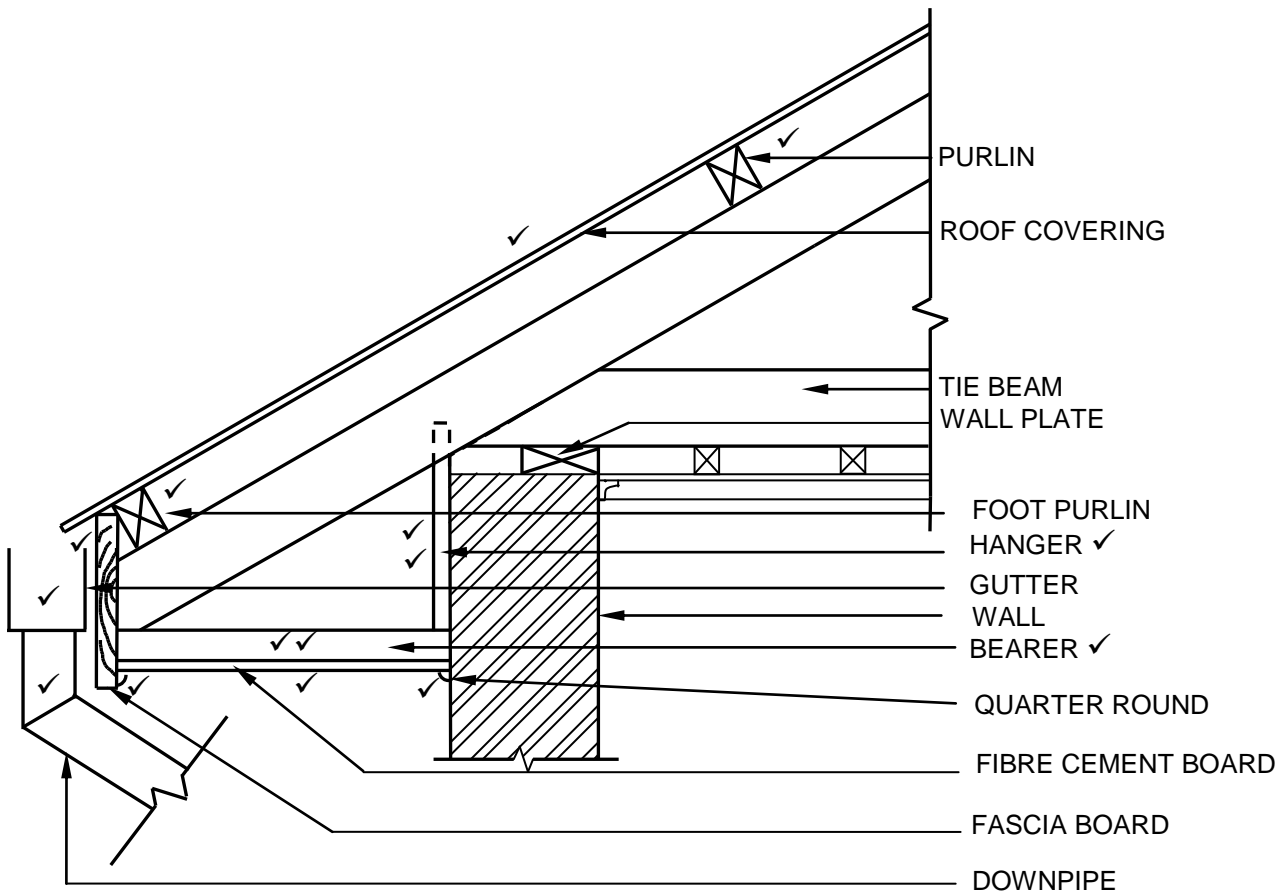
TWISTED PATTERN WALL TIE

ASSESSMENT CRITERIA	MARK
Correctness of drawing:	2

(2)

- 5.8 Plaster sand/River sand/Dune sand/Sand/Cement slurry ✓ (1)
- 5.9 Construction failure:
 - Poorly constructed edge restraint ✓
 - Haunching not correctly done**ANY ONE OF THE ABOVE** (1)

5.10

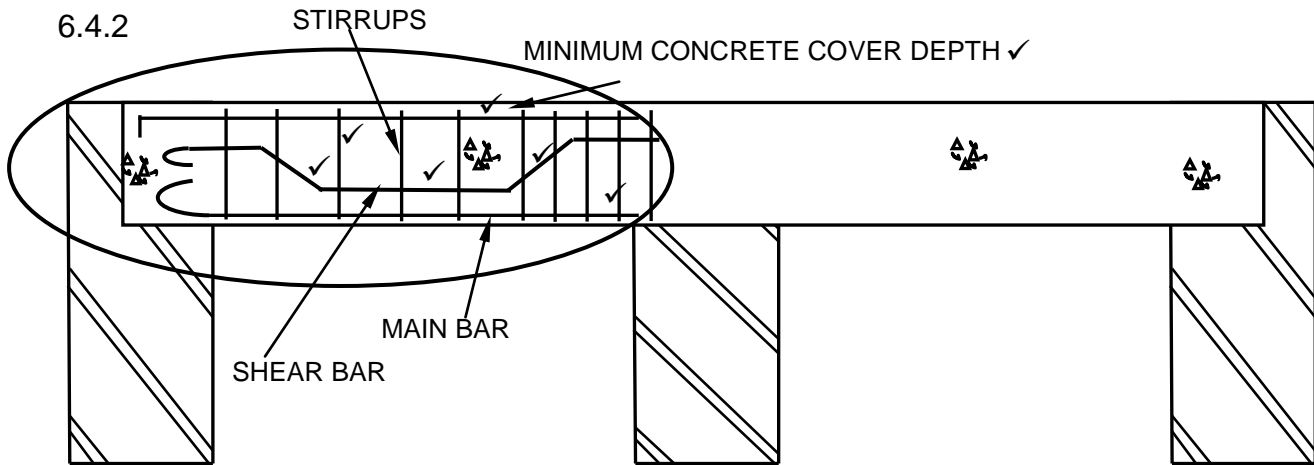


ASSESSMENT CRITERIA	MARK
Correctness of drawing:	
Hanger	2
Bearer	2
Fibre cement board	1
Quarter rounds	2
Fascia board	1
Foot purlin	1
Purlins	1
Roof covering	1
Gutter and downpipe	2
Any TWO labels	2
TOTAL	15

(15)
 [30]

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

- 6.1 6.1.1 D ✓ (1)
- 6.1.2 A ✓ (1)
- 6.1.3 B ✓ (1)
- 6.1.4 B ✓ (1)
- 6.1.5 A ✓ (1)
- 6.2 Installation of driven in-situ piles:
- Metal pipes that contain a dry concrete mix (gravel plug) are driven into a drilled hole in the ground ✓
 - A drop hammer is used to drive the pre-filled dry concrete mix (gravel plug) out of the pipe to form an extended base (toe) at the bottom of the hole ✓
 - Concrete is now poured into the pipe and compacted with a drop hammer ✓
 - The steel pipe is slowly extracted as the concrete is poured into the pipe ✓
- (4)
- 6.3 6.3.1 A - Hollow-core concrete block/Concrete block/Block ✓
 C - Reinforced ribs/Pre-stressed concrete ribs/Ribs ✓ (2)
- 6.3.2 Purpose of B is:
- Used for the placement of conduit pipes ✓
 - Serves as insulation
 - Reduce the weight
 - Lower the cost of materials
- ANY ONE OF THE ABOVE** (1)
- 6.3.3 Disadvantages:
- Mechanical handling is required on site ✓
 - Manual labour is required to place blocks ✓
- (2)
- 6.3.4 Components for rib- and- block floor:
- Steel mat/Mesh/Steel/Reinforcement ✓
 - In-situ cast concrete/Concrete ✓
 - Spacers ✓
 - Bearer/Joist
 - Props/Posts/Poles
 - Soleplate
 - Wedges
- ANY THREE OF THE ABOVE** (3)
- 6.4 6.4.1 A - Anchor bar/Pressure bar/Compression bar ✓
 B - Main bar ✓ (2)



ASSESSMENT CRITERIA	MARK
Correctness of drawing:	
Shear bar	3
Minimum concrete cover depth indicated with a label	2
Stirrups-close spacing	1
Stirrups-bigger spacing	1
TOTAL:	7

(7)

6.5 Minimum concrete cover depth in reinforced concrete is important to:

- Protect the steel against corrosion ✓
- Ensure adequate bonding between the steel and the concrete ✓
- Ensure adequate protection of steel in the event of a fire

ANY TWO OF THE ABOVE

(2)

6.6 Elements to protect reinforcing from:

- Water that is moderately aggressive ✓
- Corrosive fumes ✓
- Salt/Moisture in the air/Air
- Fire and heat

ANY TWO OF THE ABOVE

(2)

6.7.1

A	B	C	D
			Skirting: Internal dimensions of long walls
			= 8 500 mm - 440 mm ✓ OR - 2(220)
			= 8 060 ✓mm
			Skirting: Internal dimensions of short walls
			= 4 000 mm – 440 mm OR -2(220)
			= 3 560 ✓mm
			Total Length = 2(8 060+3 560) ✓ - 900 ✓
			= 2(11 602) - 900
			= 23 240 - 900
			= 22 340
			= 22,34 m ✓ skirting is needed

(6)

6.7.2

			Screed: Inside area of building
1/	8,06 ✓		
	3,56 ✓		
	<u>0,025</u> ✓	0,72 m ³ ✓	= 0,72 m ³ screed is needed

(4)

[40]**TOTAL: 200**