basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

CIVIL TECHNOLOGY: CONSTRUCTION

NOVEMBER 2018

MARKING GUIDELINES

MARKS: 200

These marking guidelines consist of 19 pages.

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

1.1

1.1.1 F ✓ (1)

1.1.2 A ✓ (1)

1.1.3 G ✓ (1)

1.1.4 E ✓ (1)

1.1.5 B ✓ (1)

1.2

- Do not throw any tools or materials from a scaffold. ✓
- Never jump on to and off a scaffold. ✓
- Never overload a scaffold.
- Remove or cover sharp edges or corners.
- Always attach free-standing scaffoldings to a building.
- Use a ladder to get on and off a scaffold.
- Keep free of waste or any other obstruction.
- Never jump on a scaffold while working on it.
- Responsible/qualified person must ensure that scaffolding is safe, rigid, stable and firm or has no defects.
- Scaffold must be supplied with guard rails/toe boards.
- Scaffolds must be levelled on uneven ground.
- Do not work on a scaffold in bad weather.
- Wear a safety harness when working on scaffolding.
- Do not throw tools on/off a scaffold.

ANY TWO OF THE ABOVE (2)

1.3

- It prevents workers from falling off the scaffold. ✓
- It is used as a handrail. ✓
- It is used to strap on safety harnesses.
- To protect the worker working on the scaffold.

ANY TWO OF THE ABOVE (2)

1.4

- The primary purpose of painting is to protect metals, wood and other material against corrosion and decay. ✓
- Provides a decorative/aesthetic appearance/finishing. ✓
- Protects surfaces from moisture penetration.
- Protects surfaces from rust/uv rays.

ANY TWO OF THE ABOVE (2)

1.5 The curing of concrete:

- Increases the strength of concrete. ✓
- Decreases the permeability of hardened concrete.
- Improves durability of concrete by reducing cracks.
- Makes concrete more watertight.
- Minimises shrinkage cracks in concrete.
- Provides volume stability.
- Cured concrete can carry more weight without breaking/crumbling than uncured concrete.
- Prevents rapid drying of concrete.
- Curing ensures that the hydration process continues.

ANY ONE OF THE ABOVE (1)

1.6

1.6.1 Multi detector ✓ (1)

1.6.2 Tool A is used:

- to detect materials found in/behind walls, ceilings and underneath floors, including ferrous and non-ferrous metals, electrical wiring, wood and metal studs. ✓
- to locate steel bars and copper pipes. ✓
- in carpentry, plumbing, and construction.
- to measure the distance to/from covered objects.

ANY TWO OF THE ABOVE (2)

1.6.3 The batteries must be removed from the tool:

- to prevent the battery from running flat/battery can die. ✓
- to prevent acid leaks from batteries damaging the tool.

ANY ONE OF THE ABOVE (1)

1.7

1.7.1 A – Bolt and nut/Bolt ✓
B – Rawl bolt ✓ (2)

1.7.2 **Bolt and nut**

- Bolts and nuts are used to secure pipe supports to metal parts. ✓
- To join components together.

Rawl bolt

- A Rawl bolt is used to fix a truss hanger to a wall. ✓
- To fix brackets/structures/panels to a wall/concrete.
- For construction, renovation and industrial work

ANY TWO OF THE ABOVE (2)

[20]

QUESTION 2: GRAPHICS AS METHOD OF COMMUNICATION (GENERIC)

ANSWER SHEET 2

NO.	QUESTIONS	ANSWERS	MARKS
1	Identify FIGURE **A**.	South Elevation/Elevation ✓	1
2	Identify FIGURE **B**.	Ground floor plan/floorplan ✓	1
3	Identify number **4**.	First floor level/Second floor level/Suspended floor/Floor level/ dash line/ FFL/Expansion joint ✓	1
4	Identify number **5**.	Window Sill ✓	1
5	Identify number **9**.	Hand wash basin/Wash basin/Washing basin/HWB/basin ✓	1
6	Identify number **10**.	Water closet/WC/Toilet pan ✓	1
7	Identify number **11**.	Bath/B ✓	1
8	On what date was the plan printed?	2018/10/02 ✓	1
9	Who drew the building plan?	JP Maloi ✓	1
10	Name the feature in the column for the notes in FIGURE 2 that must be installed in front of the sliding door.	Ramp ✓	1
11	Name the feature in the column for the notes in FIGURE 2 that must give access to the first floor.	Staircase/Stairs/Stairway✓	1
12	Identify the type of roof that is used for the building in FIGURE **A**.	Gable roof ✓	1
13	Explain the purpose of number **1**.	To cover the opening/close the gap between the two slopes of the roof. ✓ Prevent water and other elements from entering the roof. **ANY ONE OF THE ABOVE**	1

14	Explain the purpose of number **2**.	• To prevent water from falling onto the ground ✓ • To collect rainwater • To channel the rainwater into the downpipe • To protect the wall from water • To hide the rafters/finish off the roof **ANY ONE OF THE ABOVE**	1
15	Explain the abbreviation FFL at number **6**.	Finished floor level ✓	1
16	Explain the purpose of number **7**.	To channel the water from the gutter to the ground. ✓	1
17	Explain the meaning of the arrow on the feature that must be installed in front of the sliding door.	It indicates the direction of the slope of the ramp/it indicates the slope. ✓	1
18	Explain what is meant by 1:10 indicated on the symbol in the notes.	It indicates the slope or the gradient of the ramp/for every 10 metres horizontally rises 1 metre vertically.✓	1
19	Which room will feature **15** serve?	The bathroom. ✓	1
20	Explain the short dash lines on the windows.	• Indicates what direction the window is opening/window opening. ✓ • Indicates the location of the hinges. • Indicates the location of the casement stay. **ANY ONE OF THE ABOVE**	1
21	Deduce the height of window **2** from the window schedule.	1,2 m or 1 200 mm ✓(Ignore units)	1
22	Deduce the width of window **3** from the window schedule.	2 m or 2 000 mm ✓(Ignore units)	1
23	On what elevation of the building is the bathroom window situated?	Western elevation/Western side ✓	1
24	Differentiate between component	3 – window/window frame/reveal	2

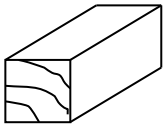
	number **3** and component number **8**.	frame stile/casement stile ✓ 8 – sliding door /door frame/ door/reveal /sliding door stile ✓	
25	Differentiate between the light in the lounge and the light in the bathroom.	The light in the lounge is a fluorescent light/1 x 40W/2x40/3x40 fluorescent light ✓ and the light in the bathroom is a normal ceiling light ✓	2
26	Recommend a suitable floor covering for the bathroom.	Tile/ Vinyl flooring (Novilon)/ Coloured screed/Polished or stained concrete flooring/Water proof laminated floor/carpet. ✓ ANY ACCEPTABLE ANSWER	1
27	Recommend an appropriate scale to which FIGURE **A** should be drawn, according to *SANS*.	1:50/100/200 ✓	1
28	Recommend an alternative sanitary fitment to replace number **11** that will serve a similar purpose.	Shower ✓	1
29	Calculate the internal area of the office in m² Show ALL calculations.	4 m ✓ x 3 m ✓ = 12 m² ✓ OR 12 4 000✓ X 3 000✓ = 12 000 000mm²	3
30	Calculate the perimeter of the building. Show ALL calculations.	Positive marking (220 + 3 000 + 110 + 2 800 + 220) ✓ x 2 ✓ = 6 350 x 2 =12 700 mm ✓ (220 + 4 000 + 110 + 2 000 + 220) ✓ x 2 ✓ = 6 550 x 2 = 13 100 mm ✓ 12 700 + 13 100 mm = 25 800 mm ✓ **OR** = 25,8 m	7
		TOTAL	**40**

QUESTION 3: ROOFS, STAIRCASES AND JOINING (SPECIFIC)

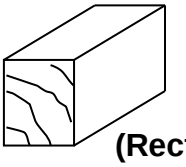
3.1 5°/10/30° ✓ (1)

3.2 1 400 mm ✓ (1)

3.3

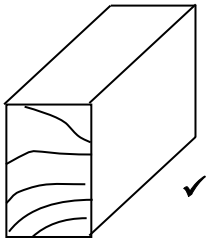


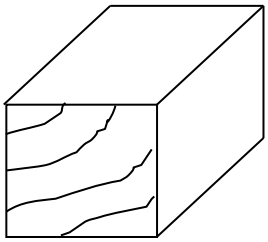
(Square) ✓



(Rectangular)

Batten





Purlin

ANY ONE OF THE ABOVE (2)

3.4 50 mm x 76 mm/ 76 mm x 50 mm ✓ OR 76 mm x 76 mm (1)

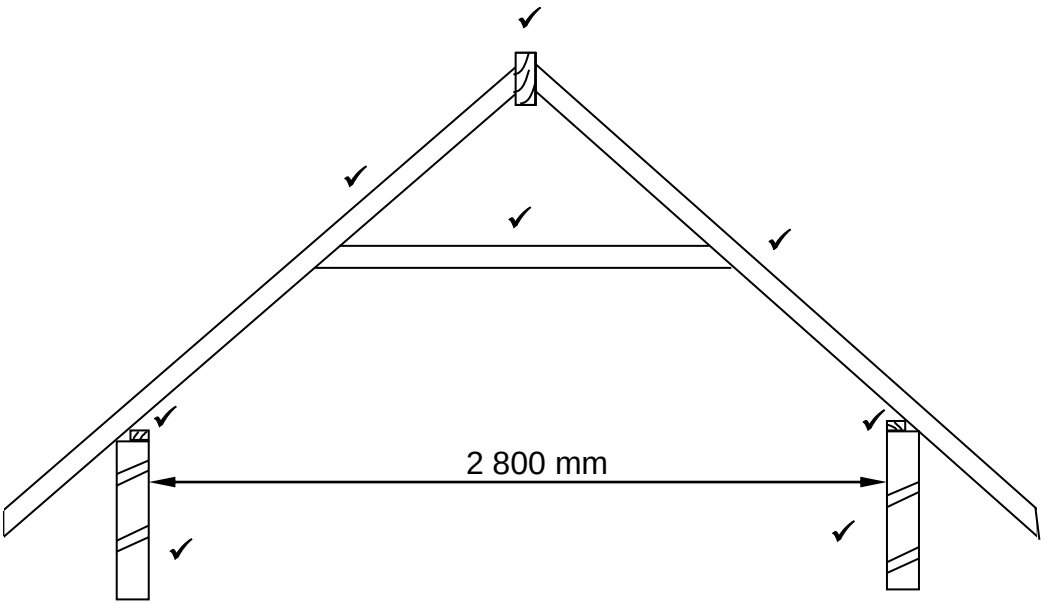
3.5

Clay roof tiles	**Fibre cement tiles**
650 mm/closer together ✓	760 mm/ further apart ✓

(2)

3.6 A - Ridge capping/Ridge plate/Roof capping ✓
B - Roof covering/Corrugated iron roof/IBR iron roof/roof sheeting ✓
C - Gang nail/Nail plate/Connector plate/Joining piece ✓
D - King post ✓ (4)

3.7



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Walls	2	
Wall plates (Wrong position – 1 mark)	2	
Rafters	2	
Collar beam/Collar tie	1	
Ridge beam correctly drawn	1	
TOTAL:	**8**	

(8)

3.8

3.8.1 Riser ✓ (1)

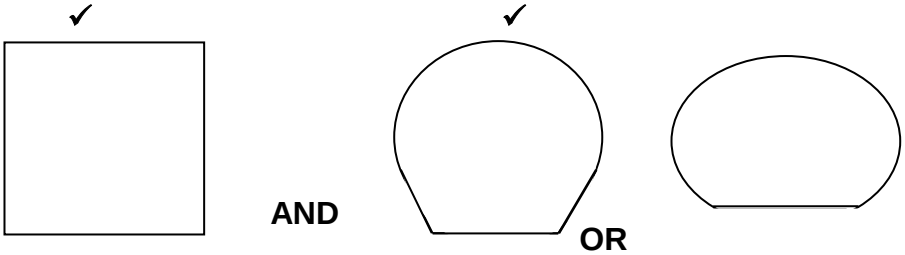
3.8.2 Balusters ✓ (1)

3.8.3 Going/Tread ✓ (1)

3.8.4 Landing ✓ (1)

3.8.5 Run ✓ (1)

3.9



(2)

ANY TWO OF THE ABOVE OR ANY OTHER SHAPE RESEMBLING A SQUARE OR ROUND SHAPE/ 2 AND 3 DIMENSIONAL DRAWINGS ACCEPTABLE

3.10
- Screwed on to the face of the wall. ✓
- By means of a bracket.
- Fixed to face of wall using Rawl bolts or sleeved anchors by means of a bracket.

ANY ONE OF THE ABOVE (1)

3.11
- Timber that is bolted to the top of the wall.✓
- Nailed or screwed to the wall. ✓
- A galvanised strap/hoop iron nailed or built into the wall.
- Tie with roof wire built into wall.

ANY TWO OF THE ABOVE (2)

3.12
- Supports the steel and withstands the loads. ✓
- The pin serves as a pivoting point to adjust the angle or to lower the steel section.
- The pin can be removed to separate the steel section from the base.
- To keep the steel section attached to the base plate/concrete base.

ANY ONE OF THE ABOVE (1)
[30]

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

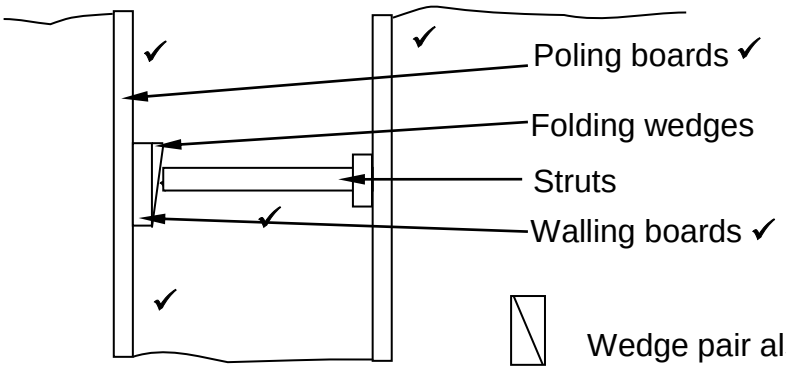
4.1 4.1.1 C ✓
4.1.2 D ✓
4.1.3 F ✓
4.1.4 E ✓
4.1.5 A ✓ (5)

4.2.1
- Keep excavated soil away from edge at least 600 mm. ✓
- Identify any equipment that will affect trench stability. ✓
- Trenches should be inspected at the start of each shift. ✓
- Trenches should be inspected after a rain storm.
- No worker will be allowed to work or move in trenches deeper then 1,5 metres if the sides are not protected by formwork or braced.
- Test for atmospheric hazards (low oxygen, hazardous fumes and toxic gases) when trenches are more than 1,3 metres deep.
- No load vehicle or plant equipment should be used, placed driven or used on or near the edge of any excavation where it is likely to cause a collapse and endanger workers lives.
- A warning system for mobile equipment should be provided.
- Always protect workers from loose rock or soil that could fall or roll from an excavation by installing protective barricades at appropriate intervals.
- Prohibit workers from working on faces of slopes or benched excavations at levels above other workers, unless workers at a lower level is protected against hazards of falling or sliding material or equipment.
- Members/parts of the support system (formwork or shuttering) should be securely connected to prevent sliding, falling material.
- Avoid overloading members of support systems.
- Formwork/shuttering should be removed in a manner that will protect workers from cave-ins.
- Before temporary removal of individual formwork members/parts, additional precautions should be in place, installing other structural members.
- Backfilling should always progress with the removal of the support system (formwork from the excavation).
- The area should be cordoned off and warning signs must be posted and must be clearly visible.
- Cover the entire work area after hours, especially if children might gain entry to the site.
- A suitable barrier(fence) must be provided where any excavation is more than 2 metres deep.
- Excavation sites should be well lit at night.
- Red warning lights should be placed strategically to warn the public.
- Workers should not work under suspended or raised loads of materials.
- Always start dismantling the formwork from the bottom of the formwork.
- Never work alone in deep excavations.

ANY THREE OF THE ABOVE (3)

4.2.2
- The site must be levelled. ✓
- The site must be cleared properly, and all loose soil must be removed.✓
- A baseline must be established. ✓ (3)

4.3



Shuttering correctly drawn ✓

ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Folding wedges	1	
Walling boards	1	
Poling boards	2	
Struts	1	
Shuttering correctly drawn	1	
Any TWO labels	2	
TOTAL:	**8**	

(8)

4.4 Good formwork should be:
- made accurately to the dimensions. ✓
- stable enough to bear the load of wet concrete.
- bear the mass of workers on it.
- able to withstand the vibrating and tamping of concrete.
- strong enough to provide enough support, without too much deflection, until the concrete has set and cured.
- easy to repair on site.
- secured with wire nails so that it can be easily dismantled.
- secured with bolts and nuts ranging from 13 mm to 19 mm in diameter.
- should be sealed properly.
- should be free of dirt such as saw dust.
- quick and simple to erect to ensure the correct cover depth for the reinforcing.
- removed only when concrete has cured.
- close-fittings along seams and joints.
- made of recyclable components.
- fitted with plywood laggings for a smooth finish.
- ensure the correct cover depth for the reinforcing in order to prevent structural failure.
- sealed properly so that the concrete does not leak and form a honeycomb effect.

ANY ONE OF THE ABOVE (1)

4.5

4.5.1 Beam formwork/Formwork for beams✓ (1)

4.5.2 A - Tie 50 mm x 25 mm at 600 mm centres ✓
B - Cleat 76 mm x 50 mm ✓
C - Fixing plate/Kicker plate 76 mm x 50 mm ✓
D - Brace/Strut 76 mm x 25 mm ✓ (4)

4.5.3
- The shape of folding wedges simplifies the erecting and dismantling of formwork. ✓
- Folding wedges can easily be removed by knocking one away from the other.
- Folding wedges help to keep formwork components sturdy/secured/stable.
- Folding wedges play an important role in the levelling of formwork for beams, floor slabs and columns.
- Folding wedges facilitate the raising or lowering of the formwork to the required height.
- Folding *wedges are used as pins to strengthen adjoining concrete formwork* (1)

ANY ONE OF THE ABOVE

4.6
- Sturdy/Rigid enough to bear the mass of wet concrete without collapsing.✓
- Stronger than wood and timber board products. ✓
- Easily removed when the concrete has set.
- Not as adaptable as timber shuttering.
- More expensive than timber.
- Will last longer than timber.
- Can be used repeatedly.
- Tight along the seams and joints so that concrete does not leak.
- It's prone to rust.

(2)

ANY TWO OF THE ABOVE

4.7 4.7.1
- Operate with care and wear appropriate personal protective equipment. ✓
- Check the controls for proper response before use.✓
- Check the condition of the machine at the start and end of each shift.
- Never use a faulty machine.
- Never lay the machine on its side.
- Do not allow the vibrating pipe to make contact with any part of the body or formwork.
- Switch of the machine when it is left unattended.
- Long use of the machine exposes the operator to vibrations. Stop if you feel numbness.
- Switch off the machine and wait for all moving parts to stop before adjusting, repairing, inspecting or cleaning it.
- Must be operated by a qualified person. (2)

ANY TWO OF THE ABOVE

4.7.2
- Maintain like all machinery. Lubricate and adjust according to the manufacturer's instruction. ✓
- Clean after use and store in a safe dry place. ✓
- Service the concrete vibrator regularly.
- *Repair or replace damaged electric cords.*

(2)

ANY TWO OF THE ABOVE

4.8
- Service the tamping rammer/plate compactor regularly. ✓
- Remove loose dirt and soil after use. ✓
- Maintain like all machinery, lubricate and adjust according to the manufacturers instruction.
- Clean after use.
- Store in a safe dry place.
- Ensure that all parts are firmly attached to the machine.
- *Repair or replace damaged electric cords.*

(2)

ANY TWO OF THE ABOVE

4.9 Ready-mix concrete:
- is very expensive. ✓
- delivery and pouring delays may affect the quality of the concrete. ✓
- site batching in residential areas raises concerns about noise levels
- must be poured within a specified time.
- trucks may damage or soil house frontages and sidewalks.
- contaminations of storm-water drains.

(2)

ANY TWO OF THE ABOVE

4.10 The purpose of the slump test:
- is to test the density of the concrete before it is placed by determining the percentage of water it contains. ✓
- Is to determine the workability and consistency of the batches that are mixed. ✓
- To determine the slump of the mixture.

(2)

ANY TWO OF THE ABOVE

4.11
- Water – hosepipe or continuous spraying ✓
- Water- retaining substances, such as damp sand, damp sacking, straw, hessian and canvas. ✓
- Plastic membranes and plastic sheeting
- Chemical curing products

(2)

ANY TWO OF THE ABOVE

[40]

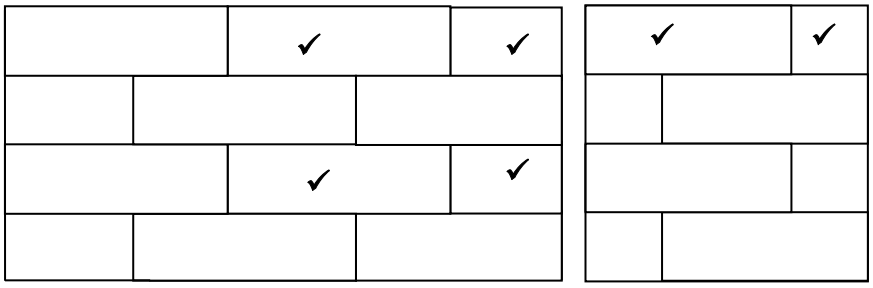
QUESTION 5: PLASTER AND SCREED, BRICKWORK AND GRAPHICS AS MEANS OF COMMUNICATION (SPECIFIC)

5.1

5.1.1 A - Wet the wall thoroughly ✓
B - Apply plaster ✓
C - Scrape the plaster to obtain a flat surface/levelling ✓
D - Float to smooth the surface ✓ (4)

5.1.2 Straight edge ✓ (1)

5.2



LEFT VIEW INCORRECTLY DRAWN -1

CRITERIA ASSESSMENT	MARK	CANDIDATE'S MARK
Full bricks and ½ brick every alternate course on front view	4	
Left view full brick every course	1	
Left view ¼ brick every course	1	
TOTAL:	**6**	

(6)

5.3

5.3.1 A- Herring bone paving pattern ✓
B- Basket-weave paving pattern ✓ (2)

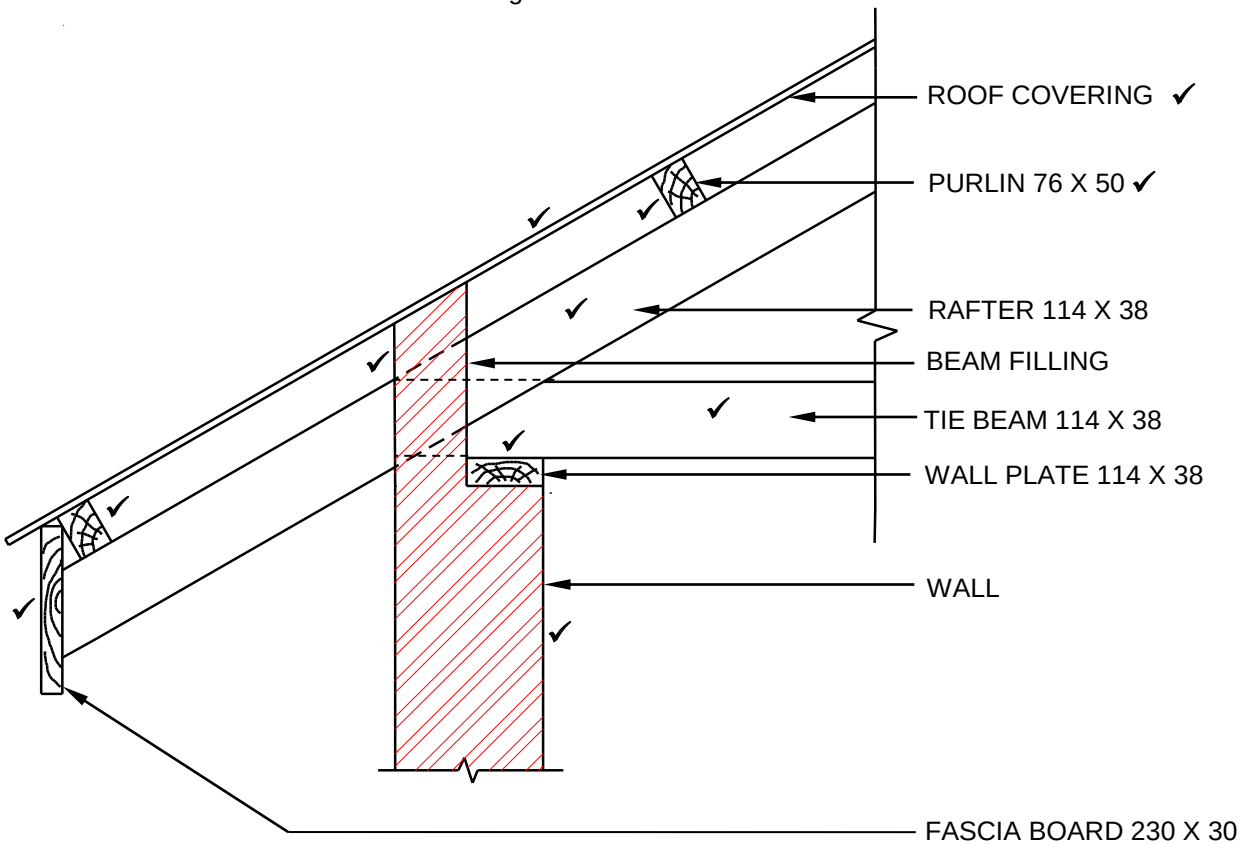
5.3.2
- Dry-laid or sand-set ✓
- Bitumen-set
- Mortar-set

ANY ONE OF THE ABOVE (1)

5.3.3
- River/Plaster sand is used to grout between paving bricks.
- Sand mixed with cement is used to grout between paving bricks ✓

ANY ONE OF THE ABOVE (1)

5.4



SCALE: 1:10 ✓

NOT DRAWN TO SCALE APPLICATION OF SCALE ✓✓✓

USE A MASK TO MARK THIS QUESTION ACCEPT ANY ANGLE BETWEEN 30° AND 45°.

ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Wall: 220 mm wide face brick	1	
Beam filling	1	
Wall plate 114 mm x 38 mm	1	
Tie beam 114 mm x 38 mm	1	
Rafter 114 mm x 38 mm	1	
Purlins 76 mm x 50 mm	2	
Corrugated iron roof covering	1	
Fascia board 230 mm x 38 mm	1	
Any TWO labels	2	
Print the scale below the drawing	1	
Application of scale One or two incorrect = 3 Three or four incorrect = 2 More than five incorrect = 1 No measurement correct = 0	3	
TOTAL	**15**	

(15)
[30]

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

6.1

6.1.1 B ✓ (1)

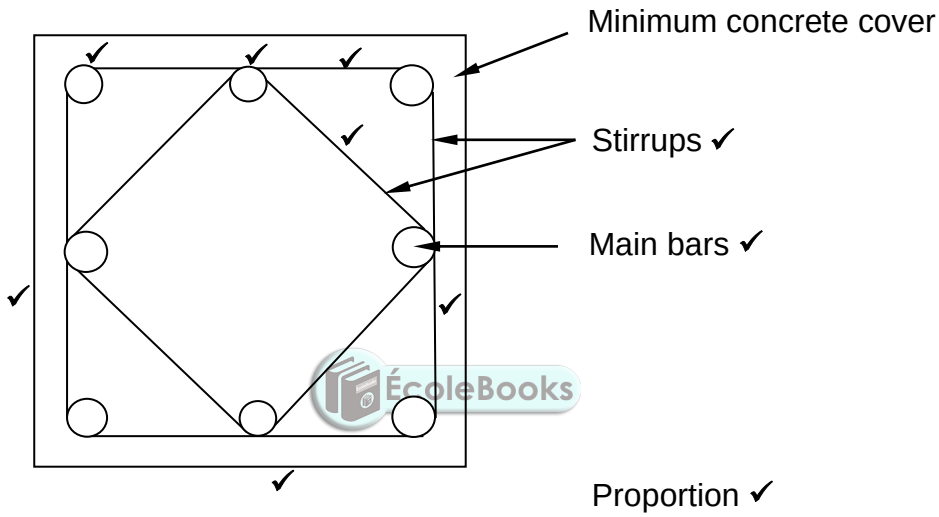
6.1.2 D ✓ (1)

6.1.3 D ✓ (1)

6.1.4 B ✓ (1)

6.1.5 A ✓ (1)

6.2



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Column	2	
8 Main bars	2	
Binders/Stirrups	2	
Min concrete cover	1	
Any TWO Labels	2	
Proportion	1	
TOTAL	**10**	

(10)

6.3 Pile foundations:

- can be used in poor/unstable/soft/loose soil. ✓
- can be used anywhere even in water. ✓
- the larger base ensures stability. ✓
- is relatively quick to install if the equipment is available.
- where pre-fabricated piles are used, much time is saved.
- resists tensile stress well.
- is quick and less expensive to produce.
- can be manufactured and transported elsewhere.
- can be installed in poor weather conditions.
- the length can easily be adjusted.
- offers good resistance against moving soil.

ANY THREE OF THE ABOVE (3)

6.4

- Metal pipes that contain a dry concrete mix (gravel plug) are driven into a drilled hole in the ground. ✓
- The pipe is held firmly in position while 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, using an internal drop hammer, until the pipe is filled to the top. ✓
- The steel pipe is slowly extracted as the concrete is poured into the pipe.

ANY THREE OF THE ABOVE (3)

6.5 6.5.1 Hollow-core concrete block/Concrete block/Block ✓ (1)

6.5.2

- Used for the placement of the conduit pipes. ✓
- Serves as insulation.
- Reduce the weight.

ANY ONE OF THE ABOVE (1)

6.5.3 Reinforced ribs/Ribs/Pre-stressed concrete ribs ✓ (1)

6.5.4

- Ribs (pre-stressed reinforced ribs) ✓
- Hollow-core blocks (polystyrene blocks can also be used) ✓
- Steel mat/Mesh/Steel/Reinforcement ✓
- In-situ cast concrete/Concrete
- Spacers

ANY THREE OF THE ABOVE (3)

6.5.5 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)

6.5.6

- Because the units are precast, mechanical handling is required on site. ✓
- The placing of the blocks between the ribs requires manual labour. ✓ (2)

6.6

ANSWER SHEET 6.6

A	B	C	D
			Skirting: Inside length of building
			= 8 000 mm – 440 mm ✓ **OR** – 2(220)
			= 7 560 mm ✓ (2)
			Skirting: Inside width of the building
			= 5 000 mm – 440 mm ✓ **OR** – 2(220)
			= 4 560 mm ✓ (2)
			Total length = 7 560 + 4 560 x 2
			=12,12 x 2
			= 24,24 ✓ meter skirting needed – 0,900 m for the door.
			= 23,34 m ✓ (2)
1/	7,56 ✓		Screed: Inside area of building
	4,56 ✓		
	0,025 ✓	0,86 m^3 ✓	= 0,86 m^3 screed is needed (4)

(10)
[40]

TOTAL: 200