

20.0 BUILDING CONSTRUCTION (446)

The subject is tested using a theory paper and a project paper. The project is set by the KNEC but is administered and scored by the subject teachers.

20.1 CANDIDATE'S GENERAL PERFORMANCE

Table 26: Candidates' Overall Performance in Woodwork for the Years, 2004, 2005, 2008, 2009 and 2010.

Year	Paper	Candidature	Maximum Score	Mean Score	Standard Deviation
2004	1	661	60	21.71	11.50
	2		40	30.35	4.07
	Overall		100	51.30	14.00
2005	1	629	60	24.90	10.25
	2		40	30.52	4.07
	Overall		100	54.99	13.00
2008	1	18	60	15.78	5.36
	2		40	33.83	2.47
	Overall		100	49.61	5.98
2009	1	195	60	18.77	8.93
	2		40	31.13	3.86
	Overall		100	49.74	10.85
2010	1	225	60	26.26	9.80
	2		40	17.53	4.88
	Overall		100	43.79	13.70

From the table, it is to be observed that:

- 20.1.1 The candidature increased from **195** in **2009** to **225** in **2010**
- 20.1.2 Performance in the theory paper improved from a mean of **18.77** in **2009** to **26.26** in **2010**;
- 20.1.3 Performance in the project decreased from a mean mark of **31.13** in **2009** to **17.53** in **2010**;
- 20.1.4 Overall performance decreased from a mean of **49.74** in **2009** to a mean mark of **43.79** in **2010**.
However, the standard deviation went up from **10.85** in **2009** to **13.70** in **2010**

Questions which were poorly performed are discussed below:

20.2 PAPER 1 (446/1)

Question No 4

- (a) List **FOUR** factors that influence the choice of pipe for installing water in a domestic house.
- (b) Explain **TWO** reasons for planting flowers around a building.

Weaknesses

- Candidates did confuse the facts about domestic water installation and drainage disposal.
- Lack of information on why we plant flowers around the building which include creating an aroma and a nice scene to attract birds or insect collections.

Expected Responses

- (a)
 - Cost factor
 - Durability – not easy to damage
 - Maintenance costs
 - Individual preference
 - Size of bore
 - Where to be used.

- (b) (i) **Beauty**
 - Should create beauty (enhance beauty)
 - Be attractive to the eye.
 - Should be welcoming and pleasant.
- (ii) **Create aroma**
 - Should develop some kind of aroma (nice smell).
 - At different times of the day should be releasing some kind of nice smell.
- (iii) **Create scene which may bring collection of birds and insects**
 - Bring insects such as butterflies which are nice to look at.
 - Bring about birds that will fly around sourcing for nectar.

Advice to Teachers

- Use suitable sketches to illustrate the proper difference between domestic water supply both cold water and hot water from the drainage disposal outlay.
- Cover the syllabus to include surface/ground treatment around the building once it is complete. This includes surface drainage works, walk ways, pavements and gardening.

Question 5

Explain TWO core areas covered by the Factories Act as applied in the construction industry.

Weaknesses

Candidates lacked coverage of facts and principles of the Factories Act.

Expected Responses

- (a)
 - (i) To protect the welfare interests that lead to the wellbeing of the workers in the construction industry in areas such as clothing where to eat e.g. site canteen, where to bathe and help themselves and their entire wellbeing.
 - (ii) Enhance work safety: This deals with their attire, proper work ethics and how they maneuver with their duties on site.
 - (iii) Health: The wellbeing of the workers in terms of first aid kits, helmets, hand gloves, goggles.
- (b)
 - Mix ratio
 - Water – connects layers to standards
 - Grading of aggregate (particle size)
 - Mixing surface (to be water-tight).

Advice to Teachers

- Identify the relevant section(s) of the Factories Act that deals with Construction Workers and cover it fully.
- Make copies of relevant parts of the Factories Act and give it to the students to read at their own free time.
- Organize site visits for candidates to see for themselves what the Factory Act stipulates and how it is adhered to in the industry.

Question 6

State the functions of each of the following components of a metal scaffold

- (i) *Double coupler*
- (ii) *Swivel coupler*

Weaknesses

- Lack of detailed information on each component of a scaffold.
- Lack of sketching techniques to visualize how the components work.

Expected Responses

- a) Functions of scaffold components.

- Double coupler – connects layers to standards
- Swivel coupler – connects cross braces/braces to standards.

Question 7

(a) Figure 2 shows the elevation of a stepped foundation at the change of ground level.

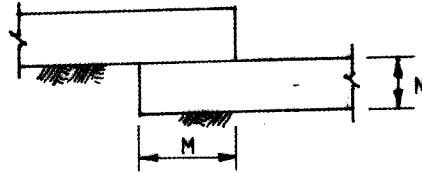


FIGURE 2

State the building code requirements for the maximum dimensions allowed for the lengths marked M and N. (1 mark)

(b) State **four** activities that are carried out to even out a trench bottom. (2 marks)

Candidates were expected to remember the Kenya Building Code requirements which states that M should be higher than the following values, N or 300 mm minimum; whichever is higher.

Expected Responses

(a) **Building code requirement**

M – Should be the higher of the following values, N or 300mm minimum whichever is higher.

(b) **The activities carried out during leveling the bottom of trench are:**

- cutting
- filling
- Ram/consolidation
- Check for level.

Question 10

Figure 3 shows a circle of radius 10mm and a point P, 50mm from the centre of the circle.

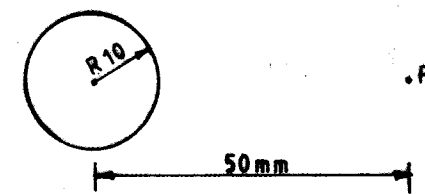


FIGURE 3

Draw the circle and construct a tangent from point P. (3 marks)

Candidates were required to draw a tangent to the given circle from point P.

Weaknesses

Candidates did not have the information of drawing a tangent.

Advice to Teachers

Practice tangent construction with the students. The principle is to join the centre point of the circle with point P. Bisect the line and draw a semi-circle; where it touches the circle draw the tangent.

Question 15

- (a) Outline the procedure of marking out and erecting a one course foundation wall on a strip foundation at the corner of a building. (7 marks)
- (b) Figure 5 shows the plan of a one brick thick wall with a pier and a T junction built in English bond.

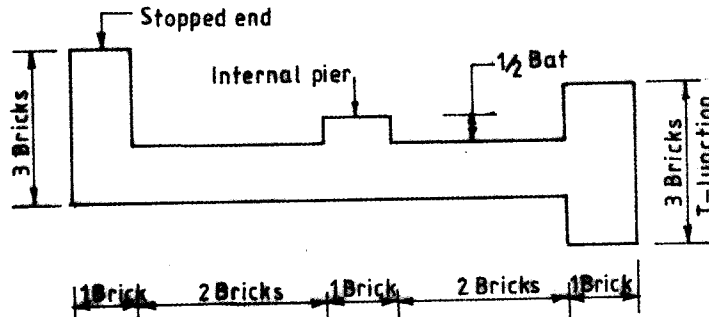


FIGURE 5

Sketch plans of alternate courses of the wall showing the bonding details.

(8 marks)

Candidates were required to come up with two alternate plan courses showing the bonding details of the wall which included the L and T junction with a pier one brick thick well in English bond.

Weaknesses

Candidates could not bond the wall and provide the alternate bonding details as required.

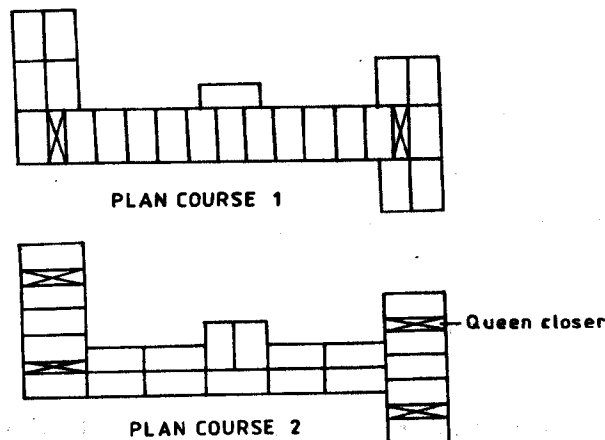
Advice to Teachers

Practice bonding details in both English and Flemish bonds upto one brick thick wall at quoins, T-junctions and piers.

Expected Response

- (a)
- Sketch lines between the corner profiles forming right angles.
 - Place mortar of the foundation slab.
 - Transfer the walls thickness on either side using a plumb bob.
 - Mark the corner of the wall on the mortar.
 - Mark another line from the second string to form a right angle.
 - Place the blocks aligned to the mark and check the blocks for plumbness, straightness and levelness.
 - Fill the vertical joint with mortar.

7 marks



29.18 BUILDING CONSTRUCTION (446)

29.18.1 Building Construction Paper 1 (446/1)



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SECTION A (40 marks)

Answer **all** the questions in this section.

- 1 (a) State **two** services required in a construction site. (1 mark)
- (b) Name **four** factors that may influence the type of building to be constructed in a particular region. (2 marks)
- 2 (a) Using a labelled sketch, show the treatment of the trench sides to a shallow excavation without timbering. (2 marks)
- (b) Give **two** reasons for placing hardcore in a building. (2 marks)
- 3 Give **two** advantages and **two** disadvantages of fixing a door frame in position after finishing the wall construction. (4 marks)
- 4 (a) List **four** factors that influence the choice of pipe for installing water in a domestic house. (2 marks)
- (b) Explain **two** reasons for planting flowers around a building. (2 marks)
- 5 (a) Explain **two** core areas covered by the Factory Act as applied in the construction industry. (2 marks)
- (b) State **two** factors that determine the strength of mortar. (2 marks)
- 6 (a) State the functions of each of the following components of a metal scaffold:
(i) double coupler;
(ii) swivel coupler. (2 marks)
- (b) Figure 1 shows an outline plan of a building.

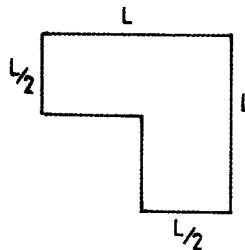


FIGURE 1

With the aid of sketches, show three ways of checking squareness using diagonals.

(3 marks)

- 7 (a) Figure 2 shows the elevation of a stepped foundation at the change of ground level.

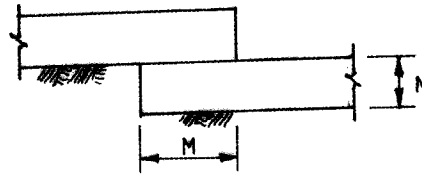


FIGURE 2

State the building code requirements for the maximum dimensions allowed for the lengths marked **M** and **N**. (1 mark)

- (b) State **four** activities that are carried out to even out a trench bottom. (2 marks)
- 8 (a) Give the reason for establishing a datum peg on a construction site. (1 mark)
- (b) List **four** positions on an external wall that may require damp proofing. (2 marks)
- (c) State **two** functions of a wall plate. (2 marks)
- 9 (a) List **four** types of floor finishes. (2 marks)
- (b) Sketch and label a kingpost truss for a span of 6m. (3 marks)

- 10 Figure 3 shows a circle of radius 10mm and a point P, 50mm from the centre of the circle.

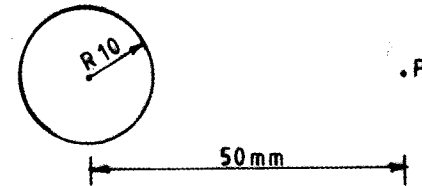


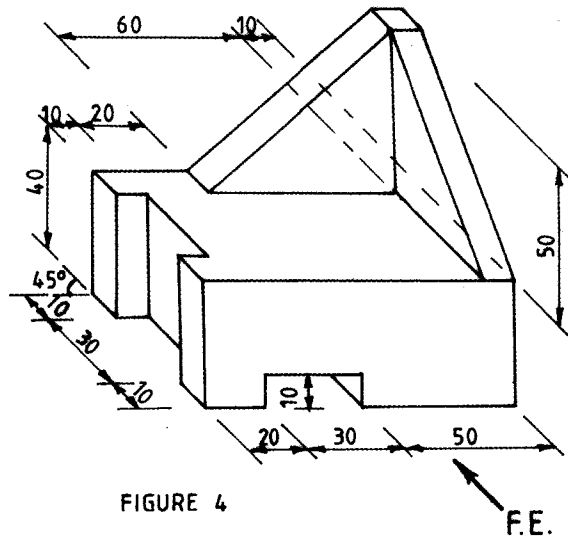
FIGURE 3

Draw the circle and construct a tangent from point P. (3 marks)

SECTION B (60 marks)

Answer question **11** and any other **three** questions from this section. Candidates are advised **not** to spend more than 25 minutes on this question.

- 11** Figure 4 shows a pictorial view of a block.



Draw full size the three views of the block in 1st angle projection. Insert **two** major dimensions in each view. (15 marks)

- 12** (a) State **three** factors that govern the pipe layout of a drainage system. (3 marks)
 (b) Using a labelled sketch, describe a combined drainage system. (12 marks)
- 13** (a) State **five** causes of failure in foundations. (5 marks)
 (b) Outline the procedure for laying a concrete ground floor. (10 marks)
- 14** (a) State **four** functions of plasters. (4 marks)
 (b) Outline the procedure for erecting a dependent timber scaffold against a masonry wall. (5 marks)
 (c) Explain **three** ways of preventing dampness penetration into the walls of a building. (6 marks)

- 15 (a) Outline the procedure of marking out and erecting a one course foundation wall on a strip foundation at the corner of a building. (7 marks)
- (b) Figure 5 shows the plan of a one brick thick wall with a pier and a T junction built in English bond.

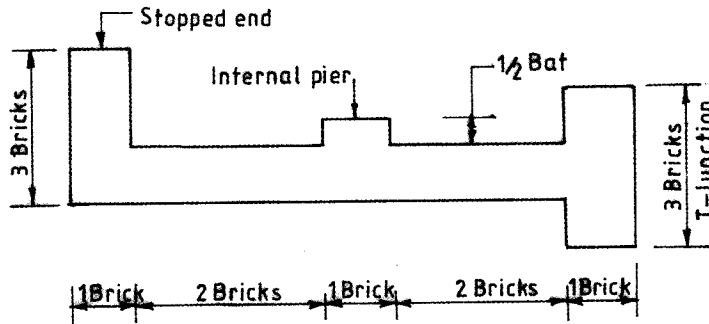


FIGURE 5

Sketch plans of alternate courses of the wall showing the bonding details.

(8 marks)

30.18 BUILDING CONSTRUCTION (446)



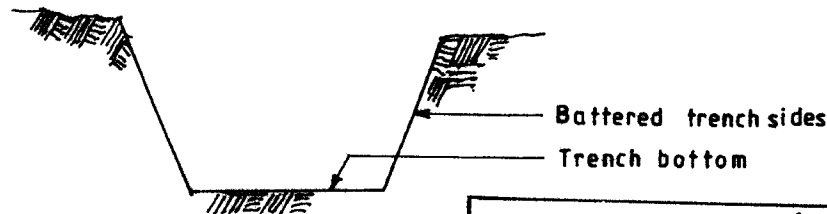
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30.18.1 Building Construction Paper 1 (446/1)

1. (a) Services required on a construction site.
- Roads for access to the site.
 - Water for consumption and for construction use.
 - Electricity supply for provision of power to used by machines on site.
 - Telephone for communication
- Any 2 x ½=1 mark

- (b) **Factors that may influence type of buildings constructed in a particular region are:-**
- Culture/traditions of the people
 - Availability of type of building materials.
 - Weather conditions in the area.
 - Land terrain.
 - Kind of wealth of the people in that region/area possesses.
 - Use of the building.
 - By-laws/local authorities' regulations.
- Any 4 x ½=2 marks

2. (a) Treatment of trench sides to shallow excavation.



Correct sketch	= 1mk
Labels Any 2 x ½	= 1mk
	<hr/>
	= 2mk

- (b) **Two reasons placing hardcore in a building at the ground floor level are:-**
- To raise the floor level after digging off the weak soil that may not sustain the building loads(s).
 - To provide a strong stable floor base.
 - Retard rise of water from ground (capillarity action).
- 2 x 1=2 marks

3. **Fixing the door frame after finishing the wall construction.**

Advantages.

- Allows the mason to construct the wall faster.
 - The frame will not be damaged since it will be put in position only after the wall construction is complete.
- 2 x 1=2 marks

Disadvantages

- Knocking out parts of the joints to fix in the rag bolts or the wall pass will weaken the wall.
- It takes time to dig the wall and again fill it in order to hold the door frame.

2 x 1=2 mark

4. (a) **Four factors to consider when choosing a pipe to use for installing water in a house are:-**

- Cost factor
- Durability – not easy to damage
- Maintenance costs
- Individual preference
- Size of bore
- Where to be used.

Any 4 x ½=2 marks

- (b) (i) **Beauty**
- Should create beauty (enhance beauty)
 - Be attractive to the eye.
 - Should be welcoming and pleasant.
- (ii) **Create aroma**
- Should develop some kind of aroma (nice smell).
 - At different times of the day should be releasing some kind of nice smell.
- (iii) **Create scene which may bring collection of birds and insects**
- Bring insects such as butterflies which are nice to look at.
 - Bring about birds that will fly around sourcing for nectar.

Any 2 x 1 = 2 marks

5. (a) **The importance of the factor act as applied in the construction industry is as follows:-**

- (i) To protect the welfare interests that leads to the wellbeing of the workers in the construction industry in areas such as clothing where to eat e.g site canteen, where to bathe and help themselves and their entire wellbeing.
- (ii) Enhance work safety: The deals with their attire, proper work ethics and how they maneuver with their duties on site.
- (iii) Health: The wellbeing of the workers in terms of first aid kits, helmets, hand gloves, goggles.

Any 2 x 1 = 2 marks

(b) Factors that determine the strength of a mortar.

Mix ratio

Water – connects layers to standards

Grading of aggregate (particle size)

Mixing surface (to be water-tight)

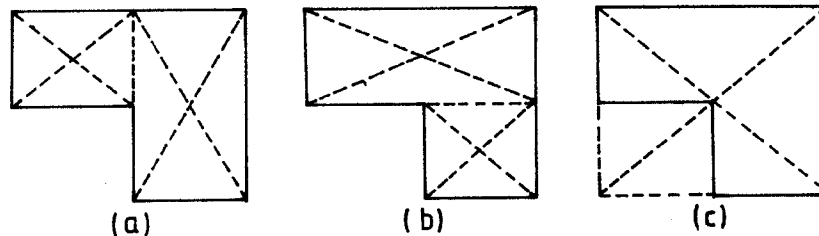
Any 2 x 1 = 2 marks

6. (a) Functions of scaffold components.

- Double coupler – connects layers to standards
- Swivel coupler – connects cross braces/braces to standards.

2 x 1 = 2 marks

(b)



3 x 1 = 3 mks

7. (a) **Building code requirement**

M – Should be the higher of the following values, N or 300mm minimum whichever is higher. (1 mark)

(b) **The activities carried out during leveling the bottom of trench are:**

- cutting
- filling
- Ram/consolidation
- Check for level.

4 x ½ = 2 marks

8. (a) **Reason of establishing a datum peg.**

A datum peg has to be established on site because all references for heights are referred from it. (1 marks)

(b) **Positions that may require damp proofing on an external wall are:**

- Between wall and floor slab
- At the threshold
- At window seal
- Above window opening

Parapet wall beneath coping.

Any 4 x 1/2=2 marks

(c) **The function of a wallplate is to:**

- Safety transfer roof loads from rafters on the walls below.
- To provide the bearing component.
- To provide the fixing media.

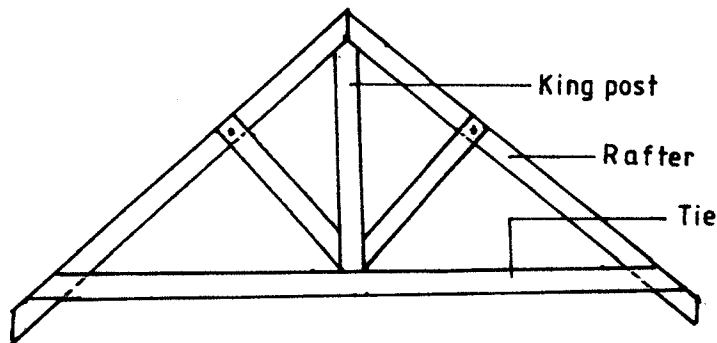
Any 2 x 1=2 marks

9. (a) **Types of floor finishes are:**

- Concrete/screed
- Tile
- Woodblocks/parquet/wooden boards
- States
- Carpets

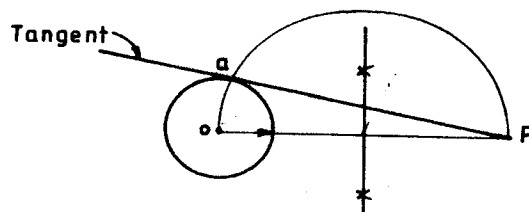
Any 4 x 1/2=2 marks

(b) **KINGPOST TRUSS**

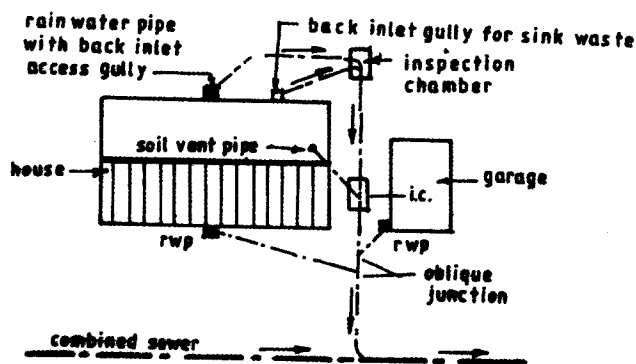


Sketch	=	1 1/2 mks
Labels Any 3 x 1/2	=	1 1/2 mks
	=	3 mks

10.



Correct ϕ of circle (20mm)	=	1/2 mk
Line OP-length (50mm)	=	1/2 mk
Bisectors of OP 2 x 1/2	=	1 mk
Semi circle	=	1/2 mk
Tangent Pa	=	1/2 mk
	=	3 mks



Description - 2
 Correct sketch - 6 marks
 Labels Any 8 x 1/2 - 4 marks
12 marks

13. (a) **Causes of failure of foundations**

- Non uniform settlement of subsoil and masonry.
- Alternate swelling and shrinkage of soil in wet and dry cycles of the season.
- Lateral escape of soil beneath the foundation.
- Roots of trees and shrubs.
- Horizontal movement of soil adjacent to the structure
- Action of weathering agents.

Any 5 x 1=5 marks

(b) **Laying the concrete ground floor.**

- Remove the soil to the required stable bed.
- Fill the room spaces with high quality hardcore.
- Ram down the hardcore until it is level with the foundation walls.
- Fix formwork against the external sides of the walls to the thickness of the concrete required.
- Fill the top part with murrum or granular material to seal the hardcore pockets and its sharp edges.
- Wet the murrum and ram it fully.
- Lay the d.p.c. over the wall and floor area to be sure of avoiding damp penetration from the ground level to the floor level.
- Pour concrete to the required depth.
- Level the concrete when still wet to achieve the required level using a straight edge.
- Cure the concrete regularly to achieve the required strength.

10 x 1=10 marks

14. (a) **Functions of plaster.**

- Aesthetics/beauty.
- Reduces rate of water absorption on the surface of the wall.
- Sound proofing.
- Thermal insulation.
- Covers the rough surface of the wall.
- Provides smooth surface to receive wall finishes.

Any 4 x 1=4 marks

(b) **Procedure of erecting dependent timber scaffold.**

- Erect standards vertically on top of base plates, about 1m from the wall and at approximately 2m intervals.
- Tie ledgers to the standards with strong rope and at convenient intervals.
- Place putlogs onto the ledgers at one end and into the wall at the opposite end.
- Place a platform/boards across the putlogs.
- Fix a guardrail and the boards onto the standards

5 marks

(c) **Prevention of dampness penetration:**

- (i) Inserting a suitable damp proof course in the thickness of the wall:
 DPC is inserted in the following positions in the wall, between the Concrete slab and the wall, at the threshold, under the window cill and above the window frame.

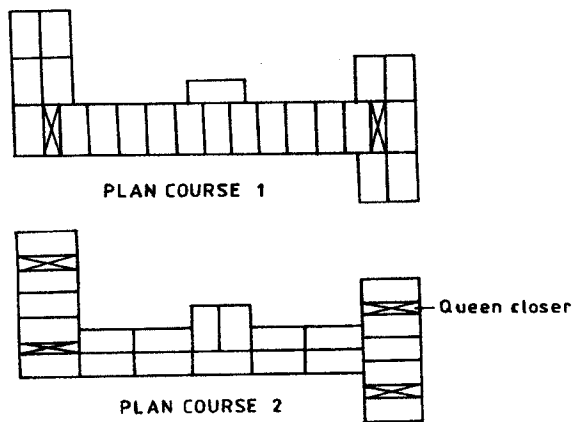
- (ii) Applying to the exposed face of the wall a barrier such as cement rendering or some suitable cladding like a vertical tile hanging.
- (iii) By constructing a cavity wall to provide a suitable barrier to the passage of moisture through the wall. 3 x 2=6 marks

15.

(a)

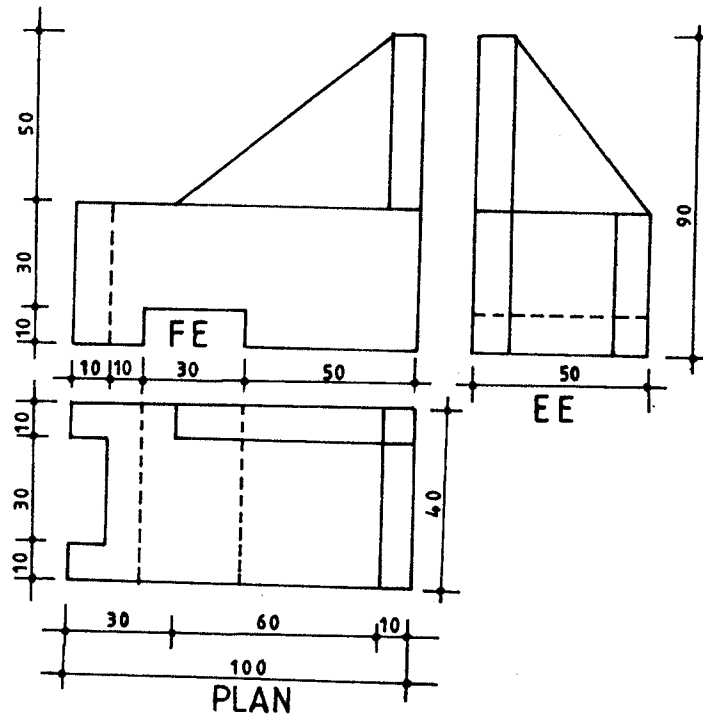
- Sketch lines between the corner profiles forming right angles.
- Place mortar of the foundation slab.
- Transfer the walls thickness on either side using a plumb bob.
- Mark the corner of the wall on the mortar.
- Mark another line from the second string to form a right angle.
- Place the blocks aligned to the mark and check the blocks for plumbness, straightness and levelness.
- Fill the vertical joint with mortar. 7 marks

(b)



Correct bonding at T-junction	2 x 1	= 2 mks
" " " Attached pier	2 x 1	= 2 mks
" " " Return angle	2 x 1	= 2 mks
" " " Stopped end	2 x 1	= 2 mks
		<u>= 8 mks</u>

11.



Correct interpretation	= 2 mks
Dimension in each view (3×2×½)	= 3 mks
Scale	= 2 mks
Correct views:	
• Plan	= 2 mks
• Front elevation	= 2 mks
• End elevation	= 2 mks
• Quality of lines	= 2 mks
	<u>= 15 mks</u>

SECTION B

12. (a) **Three factors that govern the pipe lay-out of drainage system.**
- Nature of discharge points
 - Position of discharge points
 - Drainage system of the Local Authority Sewers. 3 x 1=3 marks

- (b) **Combined drainage system.**
 In this system from roofs and paved areas together with effluent of sanitary fittings are collected together and discharged into sewer. All the drains therefore discharge into one common sewer.
2 marks