Scéimeanna Marcála *Scrúdaithe Ardteistiméireachta, 2001*

Staidéar Foirgníochta *Gnáthleibhéal*

Marking Scheme *Leaving Certificate Examination, 2001*

Construction Studies *Ordinary Level*

An Roinn Oideachais & Eolaíochta
DEPARTMENT OF EDUCATION & SCIENCE
GOVERNMENT OF IRELAND

SCRÚDÚ ARDTEISTIMÉIREACHTA 2001

LEAVING CERTIFICATE 2001

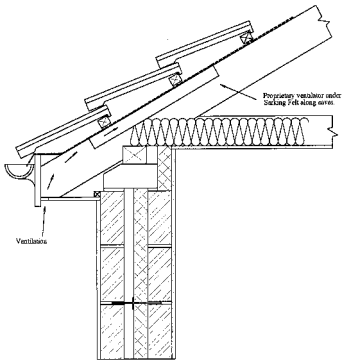
STAIDÉAR FOIRGNÍOCHTA – GNÁTHLEIBHÉAL

CONSTRUCTION STUDIES – ORDINARY LEVEL

MARKING SCHEME

Question 1

Part (a):	**Marks**
Tiles	3
Battens 50 x 25	3
Felt	3
Rafter 150 x 50	3
Wall Plate 100 x 75	3
Joist 112 x 50	3
Insulation	3
Fascia 25 Thickness	3
Soffit 15 Thickness	3
Cavity Wall 300	3
Insulation 60	3
Cavity 60	3
Tie Bar	3
Plasterboard 12.5	3
Plaster Internal 15	3
Plaster External 15	3
30° Pitch	3
Scale 1:5	3
Any 13 of above (3marks each) 39	
Presentation & Drawing	5
Sub-Total	**44**
Part (b)	
Show Method of Ventilation	6
Total	**50**



Concrete Interlocking Roof Tiles on.
44x35 or 50x25 Battens on
Sarking Felt on
150x50 Rafters on
100x75 Wall Plate
Ceiling Joists 125x50
150mm Fibre Glass Insulation
12.5 Plaster Board with Skim Coat Ceiling.
300mm Block Cavity Wall.
15mm Plaster to Cavity Wall Internally and Externally.
60mm Cavity Wall Insulation and Tie Bars.
40mm Cavity.
25mm Fascia
12mm Soffit
100mm Diameter Gutter.

CONSTRUCTION STUDIES
ORDINARY LEVEL
2001
QUESTION 1

Question 2

(a)

I. Non-loadbearing stud partition.

- A non-loadbearing stud partition is constructed using a timber framework with plasterboard at each side.
- The timber framework consists of a soleplate, vertical studs and noggings.
- The soleplate rests on and is fixed to the floor.
- The head plate is fixed to the ceiling and is vertically above the soleplate.
- The studs are spaced at 400mm centers and fixed to the soleplate and head plate.
- Two rows of noggin pieces are fixed between the studs to give strength and stability to the partition.
- All timber members are 75 x 50 minimum.

Good Note:	**8 marks**
Good Sketch:	**9 marks**

17 marks

II. Non-loadbearing solid concrete block partition.

- Constructed using standard concrete blocks on edge i.e. 440 x 215 x 100
- The bonding is stretcher bond.
- The wall is constructed on its own foundation or on precast hollow core floor units.
- The wall is plastered on both sides, 12-15 thickness.
- It is joined to other walls using expanded metal lath or bonded as blockwork proceeds.

Good Note:	**8 marks**
Good Sketch:	**9 marks**

17 marks

(b)

I. Door opening in a stud partition.

- The door opening is formed by fixing a head piece between two studs, at a height suitable for the door frame. It is nailed or screwed to the studs.
- The head piece must be equal in length to the overall width of the door frame.
- A stronger construction may be possible if the size of the studs forming the jamb are increased in size.
- A short stud is fixed to the head piece and head plate above the door opening.

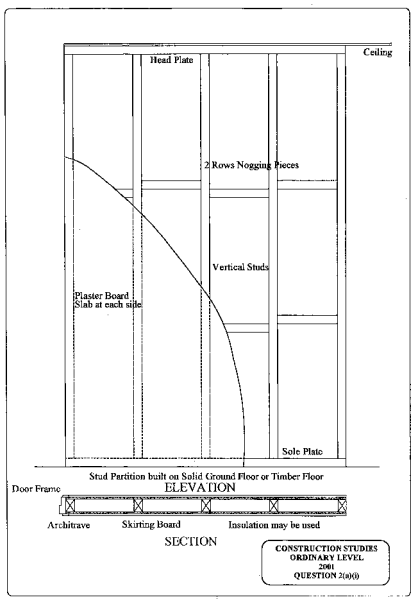
OR

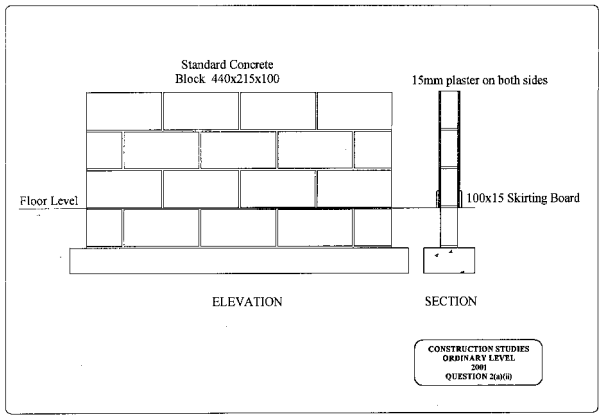
II. Door opening in a solid block wall.

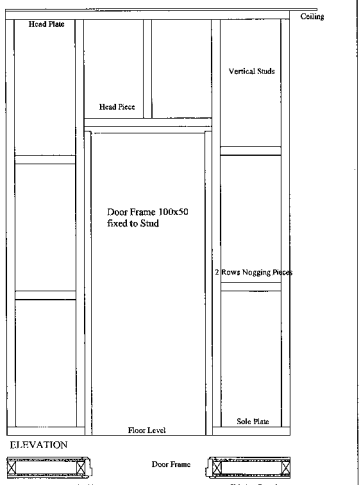
- As the wall is being constructed a space is allowed for the door frame. Some room is allowed at either side to ensure easy fitting of the frame.
- A lintel is put in position at a point equal in height to the door frame.
- The lintel may be a Precast, Prestressed, or Cast in situ. Prestressed are more widely used as they allow blockwork to proceed immediately.
- The door frame is put in place, plumbed, and fixed to the blockwork using screws and rawlplugs.

Good Note:	**8 marks**
Good Sketch:	**8 marks**

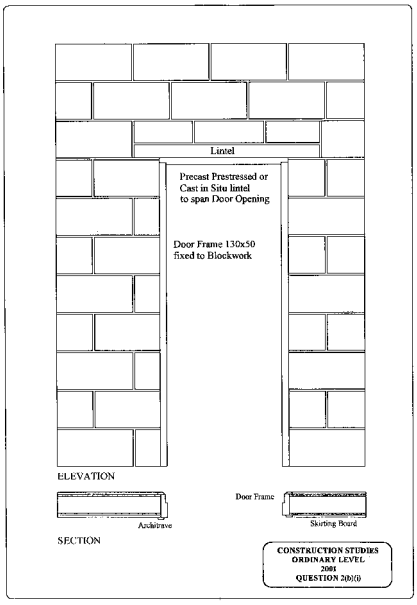
16 marks

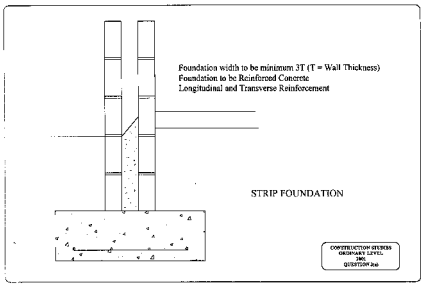

Ceiling
Head Plate
2 Rows Nogging Pieces
Vertical Studs
Plaster Board
Slab at each side
Sole Plate
Stud Partition built on Solid Ground Floor or Timber Floor
ELEVATION
Door Frame
Architrave
Skirting Board
Insulation may be used
SECTION
CONSTRUCTION STUDIES
ORDINARY LEVEL
2001
QUESTION 2(a)(i)

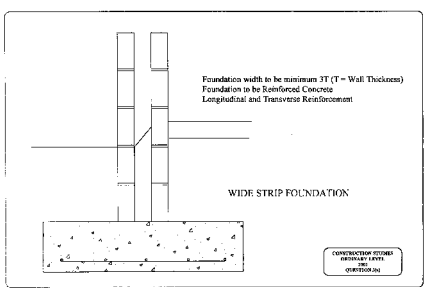

Standard Concrete
Block 440x215x100
15mm plaster on both sides
Floor Level
100x15 Skirting Board
ELEVATION
SECTION
CONSTRUCTION STUDIES
ORDINARY LEVEL
2001
QUESTION 2(a)(ii)



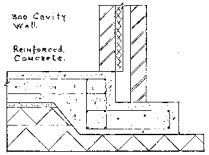
CONSTRUCTION STUDIES
ORDINARY LEVEL
2001
QUESTION 2(b)(i)


Lintel
Precast Prestressed or
Cast in Situ lintel
to span Door Opening
Door Frame 130x50
fixed to Blockwork
ELEVATION
Door Frame
Architrave
Skirting Board
SECTION
CONSTRUCTION STUDIES
ORDINARY LEVEL
2001
QUESTION 2(b)(i)


Foundation width to be minimum 3T (T = Wall Thickness)
Foundation to be Reinforced Concrete
Longitudinal and Transverse Reinforcement
STRIP FOUNDATION
CONSTRUCTION STUDIES
ORDINARY LEVEL
2002
QUESTION 2(a)

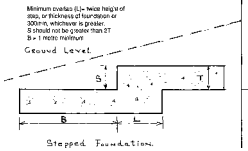

Foundation width to be minimum 3T (T = Wall Thickness)
Foundation to be Reinforced Concrete
Longitudinal and Transverse Reinforcement
WIDE STRIP FOUNDATION
CONSTRUCTION STUDIES
ORDINARY LEVEL
2002
QUESTION 2(a)

Q3a.



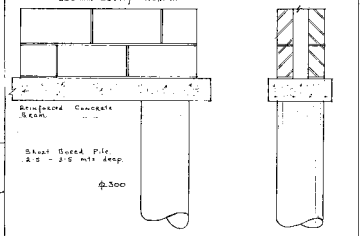
Compacted Hardcore.

Raft Foundations.



Stepped Foundations.

Q3a. Shoot Bored Pile Foundation.



ELEVATION

SECTION

Question 3 B

Strip Foundation and Stepped foundation.

The soil conditions suitable for a strip foundation would be

- Rock which would require pneumatic or other mechanical metohd of excavation
- Compact gravel or sand, which requires mechanical excavation.
- Stiff clay, or stiff sandy clay, which requires mechanical excavation.

Wide strip foundation.

The soil conditions suitable for a wide strip foundation would be

- That the load bearing capacity of the soil is low.
- If the ground is marshy, made up, or is a soft clay silt.

Short bored pile foundation.

If the depth to a suitable loadbearing stratum exceeds 1.8 mts then a Short Bord Pile foundation is an alternative to the traditional types of foundation. It is suitable for shrinkable clays, which do not contain large stones or boulders.

Raft Foundation.

The soil conditions for which a Raft Foundation is suitable would be as follows

- Soft natural ground or fill.
- Ground that is liable to subsidence.

Sketches of foundation 1	**12**
Sketches of foundation 2	**12**
Names of foundations 2 @ 6	**12**
Soil Conditions 2 @ 7 marks =	**14**
Total	**50**

Question 4

(a) Disposal of sewage from a dwelling in a rural environment.

The method widely used is The Septic Tank and Percolation Area.

- The Septic Tank is constructed on a 150mm reinforced concrete base. There is a gradual fall toward the inlet.
- The walls are constructed using concrete, concrete block or brick. Thickness is 225mm.
- The roof is constructed using precast concrete slabs. These are set slightly apart and may be fitted with rings to allow easy removal if the tank is being emptied.
- There is an inspection chamber at the inlet, and a dip pipe, which projects 450mm below the T.W.L.
- Another dip pipe is located at the outlet end, where the effluent discharges to the percolation area.
- A baffle wall is located at 1/3 length from the inlet point.

The Percolation Area.

- Consists of a distribution box from which the effluent is distributed.
- The percolation pipes are 75 diam. and laid in trenches 750 wide.
- The pipes are surrounded by 150mm of coarse gravel with a polythene membrane laid over the filter bed before backfill.
- The pipes are laid to a gradient of 1:200.
- Vents are fitted at the end of the system.

(b)

i. The Septic Tank together with the Percolation Area can be located on most sites in rural areas. The Septic Tank can be pre-cast or constructed on site, while the Percolation Area is easy to construct. The whole treatment unit when in place is tidy and unobtrusive.

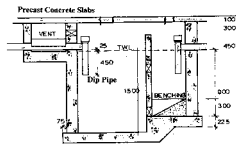
ii. Once a Septic Tank and Percolation Area is correctly constructed it functions very effectively. The system treats sewage within the tank and the effluent is rendered harmless as it seeps through the Percolation Area.

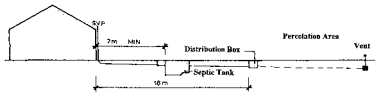
iii. No special equipment is needed for the system. It is confined on the site needing minimum maintenance. The Septic Tank makes it possible to build houses in most rural environments.

Septic tank: **Percolation:**	**Note = 9** **Note = 9**	**Sketch = 9** **Sketch = 9**	
Features:	**2 @ 7 marks**		**14**
Total:			**50**

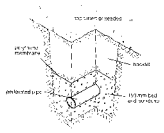
Question 4 (a)

Septic Tank





Septic Tank Effluent Disposal



Question 5

(a) Cold water supply to a kitchen sink:

- The kitchen sink is fed directly from a rising main, Ø15mm P.V.C.
- A stop valve is fitted to the pipe prior to connection to the sink.
- A drain valve is fitted above the stop valve.
- The final connection pipe to the tap may be of P.V.C. or copper.
- A tee compression joint is used to connect with the rising main.

(b) Waste water removal from a kitchen sink.

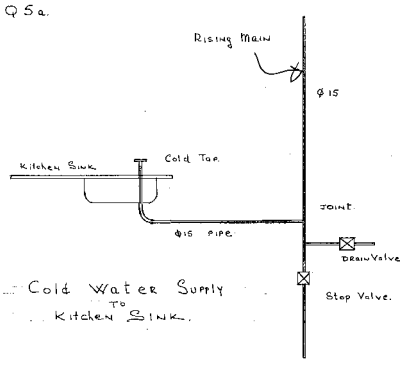
- A trap is fitted to the underneath of the sink.
- This may be a bottle trap, p-trap or s-trap.
- The trap design allows removal of the waste and a seal of water remains. Depth = 75mm.
- The water seal prevents foul air entering the building.

Or

- The waste-water leaving the sink must discharge outside the house into a gully trap.
- The gully trap has side and back connection points to allow the discharge pipe link on to it.
- The waste-water discharges above the level of the seal and below the grating or sealing plate.
- The gully trap is designed to retain a seal of water
- The seal of water prevents smells coming back from the drain system into the house.

(a)	
Good Sketch showing any 5 relevant details 5 @ 5 marks	**25**
Note	**8**
Design Feature	
(b)	
Good Sketch	**9**
Note	**8**
Total:	**50**

Q 5 a.



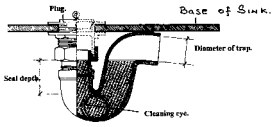
Cold Water Supply
To
Kitchen SINK.

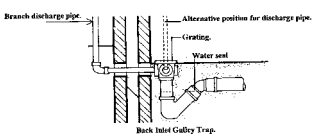
Question 5 b

Bottle Trap

P Trap

S Trap





Question 6

Window Cill:

- This is an exposed section of the buildings and dampness may penetrate here quite easily.
- Cills must be of good quality and correctly sloped to shed the eater out and away from the building.
- A continuous drip is formed to prevent the run back of water to the wall.
- Dampness may penetrate if there is no D.P.C. or if the D.P.C. is incorrectly fitted.

Jamb:

- Dampness may enter at the jamb of a window or door.
- Cavity closers are used at this point. If detailing is not correct then dampness will penetrate solid ground.

Floors:

- Rising damp will be a problem if the correct construction is not used.
- Dampness will rise by capillary attraction through the various parts of the floor.

Walls:

- Rising damp may also be a problem in walls.
- If correct construction is not used the dampness will rise through the block by capillary action.

Door Threshold:

- Because of its location this part of the door is very vulnerable to the entry of water.
- Water running down the outside of the door must be directed outwards.
- Water may be blown in under the door in windy weather.

Location 1	**10**
Location 2	**10**
Location 3	**10**

Question 6 (b)

Window Cill:

- D.P.C. must be neatly folded around the cill during construction.
- The cill must project out from the wall in order to shed off the water.
- A continuous drip must be part of the cill.
- The cill must be of good quality reinforced concrete with a smooth finish.

Jamb:

- A vertical D.P.C. must be installed at the jamb.
- Ensure that the frames are installed plumb and level.
- Frame must be fitted behind the external leaf.
- D.P.C. must be next to the outer leaf.

Solid Ground Floors:

- When the floor is being constructed a D.P.M. is laid over the total floor area.
- It must be laid on a larger of blinding.
- The D.P.M. must make a proper positive connection with the D.P.C. on the internal leaf.
- Use 1000mm gauge material for the D.P.M.

Wall:

- D.P.C. must be laid on the block work of both leaves during construction.
- It must be minimum 150mm above ground level.
- Keep cavity clean as work proceeds.
- Do not allow a build up of mortar at any point.
- Ensure that wall ties do not slope inwards.

Doors:

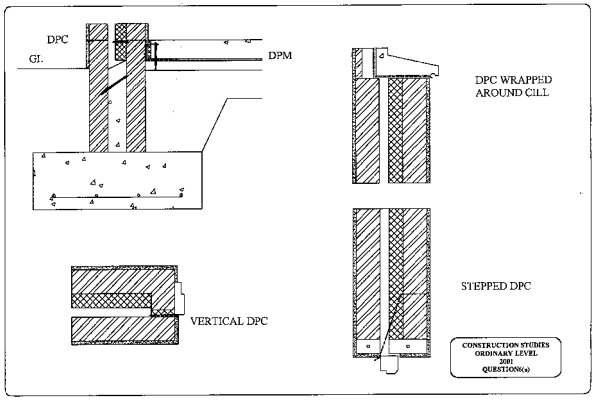
- Fix a proprietary Aluminium weather bar with rubber strip.
- Thresholds should be carefully fitted and properly sealed.
- The fitting of a weather-board will help prevent the entry of water.

Window Head / Door Head

- A stepped D.P.C. should be put in position during construction.
- Ensure that mortar droppings do not build up at this point.
- Keep cavity clean as construction proceeds.

Good Sketch showing 2 precautions, 2 @ 5 marks	10
Note giving 2 precautions, 2 @ 5 marks	10
Total	20

Total for question 6	50


DPC
GL.
DPM
VERTICAL DPC
DPC WRAPPED
AROUND CILL
STEPPED DPC
CONSTRUCTION STUDIES
ORDINARY LEVEL
2001
QUESTION(a)

Question 7

(a)

An application for planning permission is needed for the following reasons

- The proposed development must fit in with existing buildings.
- The building must conform to the terms of the Development as set out by the particular Planning Authority for the particular area.
- So that the Planning Authority can decide if a building blends in with the surroundings, i.e. the landscape the streescape.
- To prevent development without thought and consideration for residents of an area.
- It informs people the right to object to new buildings.
- Planning permission is a legal requirement.

Reason 1	**6**
Reason 2	**6**
Reason 3	**6**

Procedure:

- Engage an architect.
- Give a clear brief of the development needed.
- Sketchs and drawings will be produced.
- Notices put on newspaper and site.
- Submit plans to Planning Authority within 14 days of notices being put in place.

In order to obtain the Full Planning Permission the following should be forwarded to the local Planning Authority.

- Three completed copies of the application form.
- Three copies of the site layout plan. Scale 1:500
- Details of Septic Tank Treatment system if applicable.
- Three copies of properly dimensioned plans, elevations and sections of the proposed buildings.
- Three copies of the revelant page of the newspaper circulating in the area in which there has been published notice of the applicant's intention to make this application.
- Two copies of the site notice.
- Relevant fee of £47 as of May 2001.

Any 4 items @ 6 marks each	**24**
Procedure	**8**
Total:	**50**

Question 8

(a)

Lathe, Pillar Drill, Mortising Machine etc.

Safety precautions to be displayed may include:

- Obtain permission to use the machine.
- Wear goggles.
- Keep the area clean and tidy around the machine.
- Ensure the piece is held securely
- Concentrate on the work being carried out.
- Never wear loose clothing and tie back long hair.
- Disconnect from the power when making adjustments.

Orbital Sander, Belt Sander.

Safety precautions to be displayed may include:

- Wear a dust mask.
- Ensure the power is switched off before connecting to the mains.
- Wear ear muffs.
- Keep the area around the work clean and tidy.
- Take care of the lead.

Bandsaw.

Safety precautions to be displayed may include:

- Use safety goggles
- Always keep your hands on either side of the line being followed.
- Disconnect from the power when not in use.
- Concentrate on your work.

Jigsaw and Electric Drill

Safety precautions to be displayed may include:

- Use safety goggles.
- Ensure the piece is held firmly.
- Disconnect from the power for any adjustments.
- Keep the cable away from the blade or bit.
- Ensure the cable is in good condition.

Question 8 contd.

The Circular Saw.
Safety precautions to be observed.

- Wear safety goggles.
- The guard and other safety equipment should be in place.
- Keep the floor area around the machine clean and tidy.
- Never interrupt a person who is using the machine.

The Router.

Safety precautions to be observed.

- Wear safety goggles.
- Ensure the router is switched off, before connecting to the mains.
- Wear a dust mask.
- Allow the router to stop before laying it on the bench.
- Keep the lead away from the cutter.
- Ensure the lead is in good condition.

Reasons for safety precautions.

Safety goggles.
Protect face and eyes when using power tools or machines.

Dust Mask.

Prevents inhalation of dust by the operator

Ear Muffs.

Protects the operator's ears from excessive noise of power tools and machines.

Tidiness.

The area around the machine should be kept clean and tidy. This prevents accidents and provides a more pleasant working environment.

Concentration.

Lack of concentration can very easily lead to an accident. Interrupting a person who is using a machine may lead to an accident.

Question 8 contd.

Switch off before connecting to the mains.

This prevents the machine starting unexpectedly, preventing a serious accident. This applies especially to belt sanders.

Leads.

If the moving part comes in contact with the lead it can cause a very serious accident. A damaged lead is also dangerous

Hands.

When using any power tools hands must be kept away from any moving parts, e.g. bits blades or cutters. A serious cut or burning may result if due care is not taken.

Firm Hold.

When using the pillar drill the piece must be held firmly, otherwise it may spin causing serious injury to the operator. While using the lathe, the work piece must be securely fixed and checked to prevent accidents.

Loose clothes and long hair.

Loose clothes or jewellery may become entangled in machines or power tools, with obvious consequences, as is the case with long hair.

Question 8 (b).

Safety precautions to be observed by students when engaged in practical work

- Keep the bench neat and tidy
- Brush off shavings and dust.
- Obtain permission from the teacher before using power tools or machines.
- Always wear goggles, ear muffs or masks as required.
- Use chisels and all tools as directed by the teacher.
- Keep hands away from moving parts of sawa, drills, planers etc.
- Concentrate on the work being carried out.
- Do not interrupt a person using power tools or machines.

(a) Select one power tool or machine	**5**
3 safety precautions @ 5 marks each	**15**
Reasons 3 @ 5 marks each	**15**
Student - Precautions	
(b) 3 safety precautions @ 5 marks each	**15**
Total:	**50**

Question 9.

i. **Wall Plate**: This is a horizontal member resting on the top of the external wall. It provides a fixing for rafters and trusses, and it distributes the load evenly from them to the wall. It is secured to the wall by galvanized straps. The wood used is W. Deal and treated with preservative, with a cross-section size of 100 X 75.

ii. **Cornice**: The cornice is a decorative moulding fixed to the internal wall at the junction of the ceiling and the wall. As well as being decorative it also covers any cracks or defects that occur at this point. Cornice can be purchased in lengths and may be fixed in place using screws,or manufacturers adhesive.

iii. **Rafter**: The common rafter is made of White Deal (150 X 50). It is fixed to the wall plate by means of the birds mouth and nails. The rafter runs from the eaves to the ridge parallel to the roof slope. It supports the battens and roof materials. A Jack rafter is a shorter version and spans from eaves to hip or from ridge to valley.

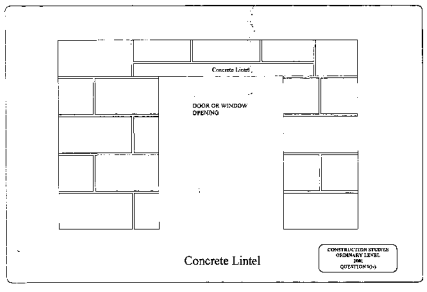
iv. **Concrete Lintel**: This is a simple concrete beam spanning a window or door opening. It transfers the weight of the walling above it to the jambs. A concrete lintel may be cast in-situ, precast or pre-stressed. Steel is used to counteract the weak tensile strength of the concrete.

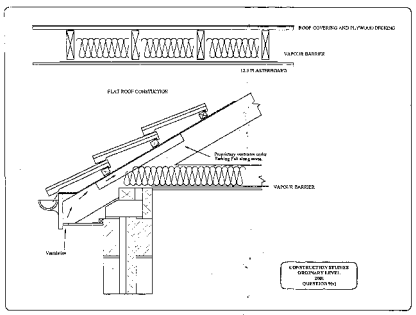
v. **Vapour Barrier**: A Vapour Barrier or Vapour check is a layer of building material, which has a high resistance to the passage of water vapour. A vapour barrier is installed if there is a danger of interstitial condensation within the structure or the insulation. Examples of a vapour barrier are 500 gauge polythene or foil-backed plasterboard. The vapour barrier is always on the warm side of the insulation. Vapour barriers are used in Flat & Dormer Roof construction, and in Timber Frame Wall detail.

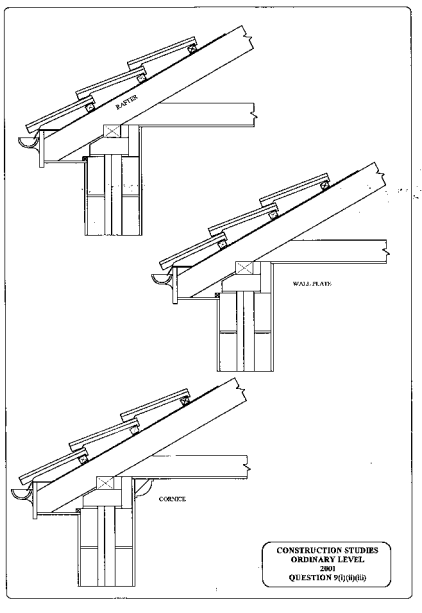
vi. **Architrave**: An architrave is used to conceal or cover the joint between a door frame and the wall. It consists of two vertical members with one horizontal and mitered at the corners. The architrave is nailed neatly to the frame and the wall. The skirting adjoins the architrave at floor level. Architrave can be attained in various sizes and in a variety of woods.

vii. **Wall Tie**: A wall tie is a specially designed item, used in the construction of cavity walls. Its function is to "tie" the two leaves together giving the wall stability. The wall ties are placed at intervals across the cavity and are bedded in the horizontal joints of each leaf. Ties should be spaced at 750 horizontally and 450 vertically. Ties should be installed with the drip downwards. Ties are available as galvanised, or the special stainless steel type used with cavity wall insulation.

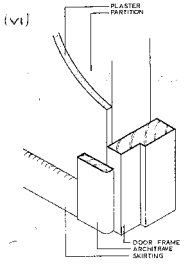
Notes 5 @ 5 marks	**25**
Sketch 5 @ 5 marks	**25**
Total	**50**


Concrete Lintel
DOOR OR WINDOW OPENING
Concrete Lintel
CONSTRUCTION STUDIES
SECONDARY LEVEL
2006
QUESTION 9(a)


ROOF COVERING AND PLYWOOD DECKING
VAPOUR BARRIER
12.5 PLASTERBOARD
FLAT ROOF CONSTRUCTION
Ventilator
VAPOUR BARRIER
CONSTRUCTION STUDIES
ORDINARY LEVEL
2006
QUESTION 9(c)

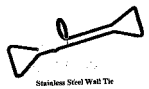

RAFTER
WALL PLATE
CORNICE
CONSTRUCTION STUDIES
ORDINARY LEVEL
2003
QUESTION 9(i),(ii)(iii)

(vi)



(vii)

Galvanised Wall Tie



Stainless Steel Wall Tie