



Coimisiún na Scrúduithe Stáit State Examinations Commission

Scéimeanna Marcála

Scrúduithe Ardteistiméireachta, 2005

Staidéar Foirgníochta

Gnáthleibhéal

Marking Scheme

Leaving Certificate Examination, 2005

Construction Studies

Ordinary Level

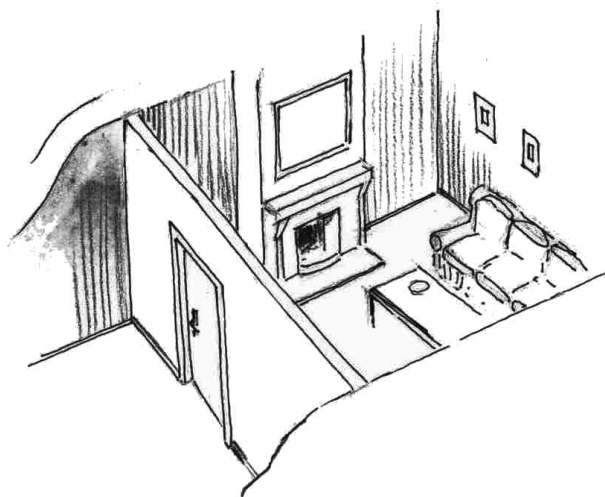


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Teoiric – Gnáthleibhéal

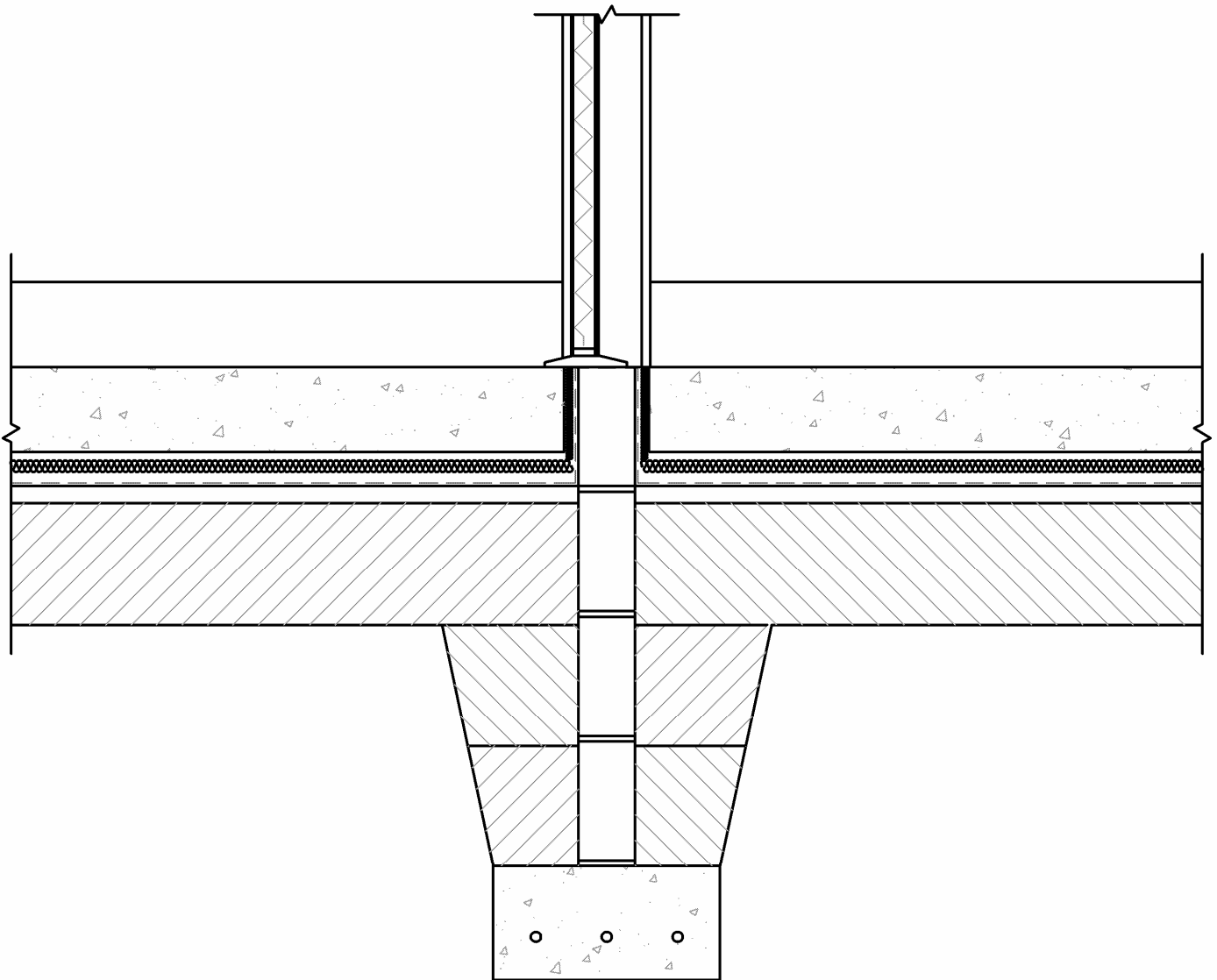


Construction Studies

Theory – Ordinary Level

Freagraí agus Scéim Mharcála
Solutions and Marking Scheme

Question 1.



100mm Concrete Block Wall.

15mm Hardwall plaster on both sides

Standard Flush Door

130x50 Door Frame.

75x15 Architrave.

100x15 Skirting.

18mm Door Saddle.

150mm Smooth Concrete Floor.

60mm Insulation.

Radon Barrier.

30mm Sand blinding.

200mm Hardcore.

200mm Reinforced Concrete

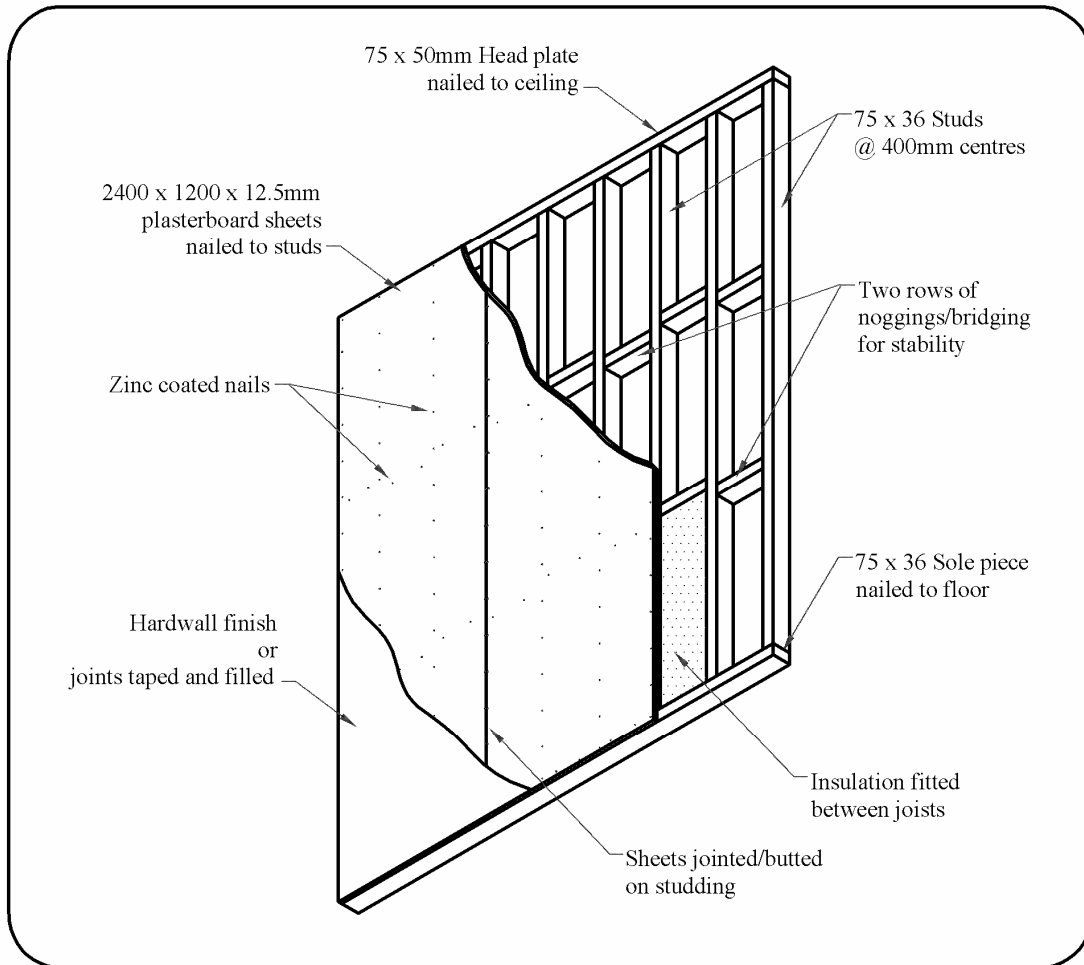
Foundation.

Question 1.

Details	Marks.
100mm Block Wall.	4
Plaster on one side.	4
Plaster on other side.	4
Standard Flush door.	4
130x50 Door Frame.	4
75x15 architrave.	4
100x15 skirting Board.	4
18mm Door Saddle.	4
150mm Smooth Concrete floor and screed.	4
60mm Insulation.	4
25mm Edge Insulation.	4
Radon Barrier.	4
30mm Sand Blinding.	4
200mm Hardcore.	4
200mm Reinforced Concrete Foundation.	4
Steel Bars in Foundation.	4
Any 10 of above details (4 marks each)	
Sub-total	40
Draughting and scale	(2 x 5 marks)
	10

Total= 50 marks.

Question 2.



(a) Construction of stud partition.

- q Stud partitions consist of a layer of plasterboard nailed to each side of the timber frame.
- q The standard size of studs is 75mm x 50mm with a minimum size of 75mm x 36mm.
- q The studs are fixed at 400mm centres to suit the 1200mm plasterboard sheets.
- q When the partition runs parallel to the floor joists, the partition should be built off double joists to avoid the ceiling cracking or, alternatively, should be placed on top of an extra joist placed under the partition..
- q Studs are made rigid by the inclusion of two rows of noggins, which are staggered to allow for nailing.
- q Each end of the noggins should be doubled nailed.
- q Services should run in holes drilled on the centreline of the studs.
- q The plasterboard is secured to the studs using galvanised or coated nails or screws.
- q The nails should be driven home without damage to the plasterboard.
- q The long edges of the plasterboard should be fixed parallel to the studs so that the joint is on a stud.
- q Fibreglass mat cut to size is fitted between studs and noggings.

Question 2 cont.

Question 2 (Alternative)

(a) Construction of stud partition.

- q Mark the line of the sole plate first.
- q Before the sole plate is secured, ensure that the locations of any electric cables, water and other services under the floor are known.
- q Secure the sole plate to the floor, nail/screw through the sole plate into the joists.
- q Use a vertical straightedge to locate the line of the top plate.
- q Secure the top plate to the ceiling.
- q Measure the distance between the top and sole plates at each end, and cut the end studs slightly longer than this to ensure a tight fit.
- q Fix the end studs to the existing walls using screws and plugs.
- q The length of each intermediate stud should be individually measured and cut.
- q Secure each stud by skew nailing into the plates.
- q When all the studs have been erected measure cut and fit the noggins.
- q The basic frame is now complete, and any holes for pipes or cables can be drilled through the timbers.
- q The plasterboard should be cut 13mm shorter than the floor to ceiling height, taking account of any variations.
- q Check that the edges are centred over the studs, and fix it in position using galvanised nails.
- q Finally put jointing tape over the joints and apply a thin coating of plaster.
- q Skirting board should be cut and secured to the bottom of the partition by nailing through the skirting into sole plate.

(b) Two methods are used to provide a surface finish on plasterboard prior to painting.

Method No.1

- q Plasterboards are fixed in place correctly with all edges supported and nailed firmly.
- q Reinforce all internal corners with 90mm jute scrim.
- q Reinforce all external corners with angle bead.
- q Finish with a skim coat using steel float giving a smooth finish.
- q The surface is allowed dry out before painting.

Method No.2

- q Tape and fill all joints and internal angles.
- q Fill the nail holes.
- q Apply joint filler to the joints.
- q Smooth off the filler and finish with a sponge.
- q Internal and external corners may be finished in a similar manner.
- q The surface is allowed dry out before painting.

(c) Recommend one finish.

Reasons for Finish 1

- q The wall has a smoother finish
- q The surface is more hard wearing.
- q The wall has a level surface

Reasons for finish 2

- q It is faster to finish this wall.
- q The initial drying out time is shorter.
- q This method is cleaner when being applied.

Question 2.

Part (a).

Details:

Marks.

Primary communication of relevant information.

Valid detail 1	4
Valid detail 2	4
Valid detail 3	4
Valid detail 4	4

Other communication of relevant information.

Valid detail 1	4
Valid detail 2	4
Valid detail 3	4

Part (b).

Method 1.

Valid description 1	4
Valid description 2	4

Method 2.

Valid description 1	4
Valid description 2	4

Part (c).

Recommended finish.

Finish	2
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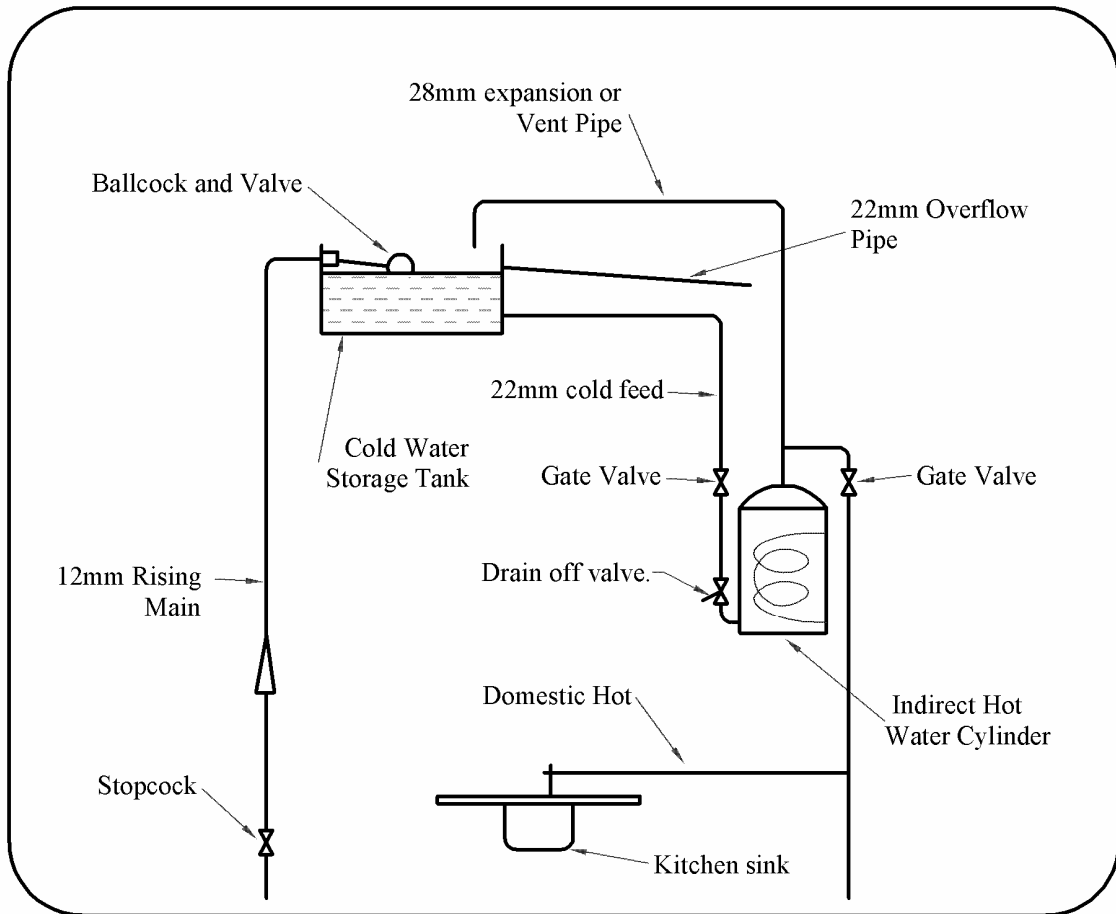
Reasons for recommending finish.

Valid reason.	2
Valid reason.	2

Total =50 marks

Question 3.

(a)

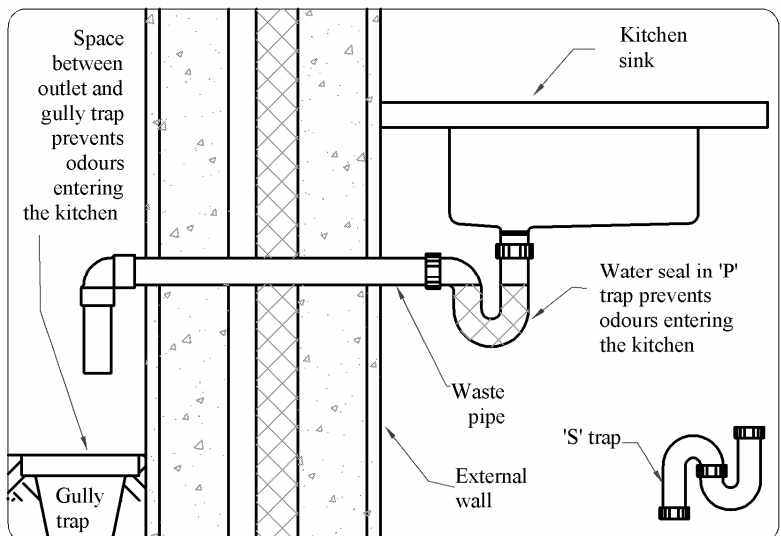


(b)

q By fitting a 'P' or 'S' trap on the waste pipe odours are prevented from entering the kitchen.

OR

q The air circulating between the end of the outlet and the gully trap prevents odours from entering the kitchen. A space must be provided between the end of the outlet and the gully trap.



Details:

Marks.

Part (a)

Stop cock	4
12mm rising main.	4
Water storage tank.	4
Ballcock and valve.	4
22mm overflow.	4
Gate valve.	4
22mm Cold feed.	4
Drain off valve.	4
Indirect hot water cylinder.	4
Expansion pipe	4
Gate valve.	4
Domestic hot water.	4
Connection to sink.	4
Any eight of the above (4 marks each)	
Sub-total	32
Quality of sketch	8

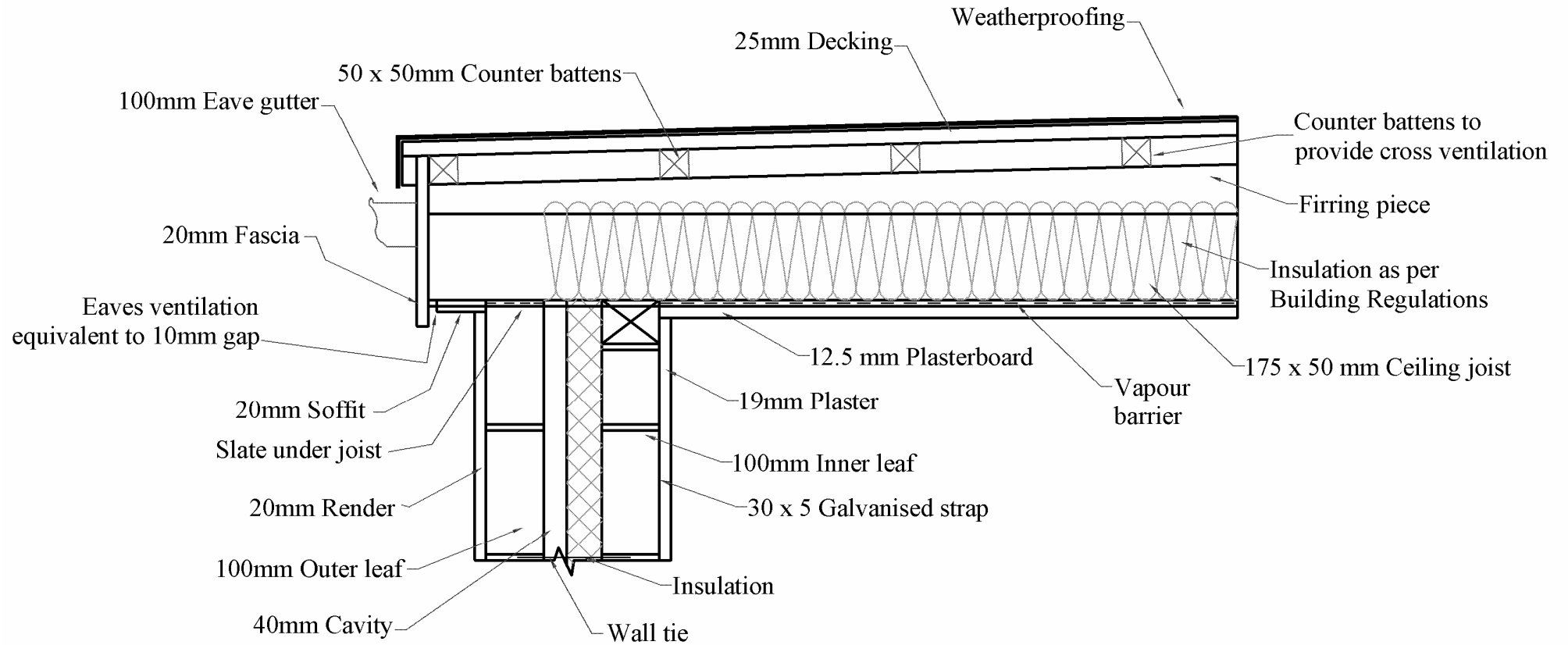
Part (b)

Other communication of relevant information	6
Other communication of relevant information	4

Total = 50 Marks.

Question 3.

Question 4.



Question 4.

Details: Part (a).	Marks
Weatherproofing.	4
25mm Decking.	4
50mm Counter battens.	4
Furring piece.	4
175 x 50mm Ceiling joist	4
Wallplate and strap	4
20mm Fascia.	4
Eave gutter.	4
19mm soffit.	4
External render.	4
100mm outer leaf.	4
Cavity and wall tie.	4
Insulation.	4
100mm inner leaf.	4
19mm internal plaster.	4
12.5mm Plasterboard and plaster.	4
Roof insulation.	4
Vapour barrier.	4
Any 10 of the above (4 marks each)	
Sub-total	40
Draughting and scale.	(2 x 3 marks)
	6
Design detail	4

Total =50 Marks.

Question 5.

· Drilling 10mm hole in acrylic:

(a) Safety precautions to be observed when drilling a hole through 6mm acrylic:

- Ideally use a Pillar Drill. Cordless or Electric drill will also be suitable.
- Ensure the piece is held firmly in place when drilling.
- A solid piece of wood should be placed under the acrylic.
- The acrylic and the supporting piece should be cramped firmly together.
- Proceed with drilling operation slowly and use correct speed.
- Use correct eye protection.

(b) Reasons:

- Pillar drill is solid, firm, safe and accurate.
- Piece must be held firmly for safety.
- The wood will prevent shattering of the acrylic.
- Eye protection protects the eyes in case of chips breaking off.

· Using Jig Saw:

(a) Safety precautions to be observed when using a Jig Saw:

- Ensure the piece is held securely.
- Ensure the lead is well clear of the cutting blade.
- Cut slowly and carefully especially at the start of the cut.
- Concentrate on the work being carried out.
- Use correct eye protection.

(b) Reasons:

- The piece must be firm as movement could cause an accident
- Danger of cutting the lead if it is too close.
- The saw may jump at the start and this could damage the work or cause an accident.
- Safety must always be on the mind when using electric power tools.
- Goggles protect the eyes from chips or particles.

Question 5 cont.

· **Electric Drill out of doors:**

(a) Safety precautions to be observed when using an electric drill out of doors:

- q Use the drill in dry conditions.
- q Ensure the lead is in good condition.
- q Scaffolding if being used should be safe and correctly erected.
- q Use correct eye protection.

(b) Reasons:

- q Danger of electric shock if working in wet conditions.
- q Damaged lead is very dangerous.
- q Good scaffolding properly erected is very important if it is needed.
- q Goggles protect the eyes from grit and dust.

· **Placing a ladder in position:**

(a) Safety precautions to be observed when placing a ladder against the external wall of a house:

- q Make sure that the ladder is right for the job.
- q Check to make sure that the ladder is in good condition.
- q The ground should be firm and stable.
- q The angle of the ladder should be at about 75° .
- q Never use a makeshift ladder.
- q Check for overhead electric cables.

(b) Reasons:

- q It is extremely dangerous to use a defective ladder.
- q Unstable ground or rough ground is not suitable
- q Angle of ladder is very important. If it is too steep or too low a pitch this may result in a serious accident.
- q Overhead cables are dangerous and care should always be taken when working in their vicinity.

Question 5.

Details:

Marks.

Part (a) and (b)

Drilling a hole in acrylic.

Safety precaution 1.	4
Valid reason.	2
Safety precaution 2.	4
Valid reason.	2

Using a jig saw to cut a curve in 6mm Plywood.

Safety precaution 1.	4
Valid reason.	2
Safety precaution 2.	4
Valid reason.	2

Using electric drill out of doors.

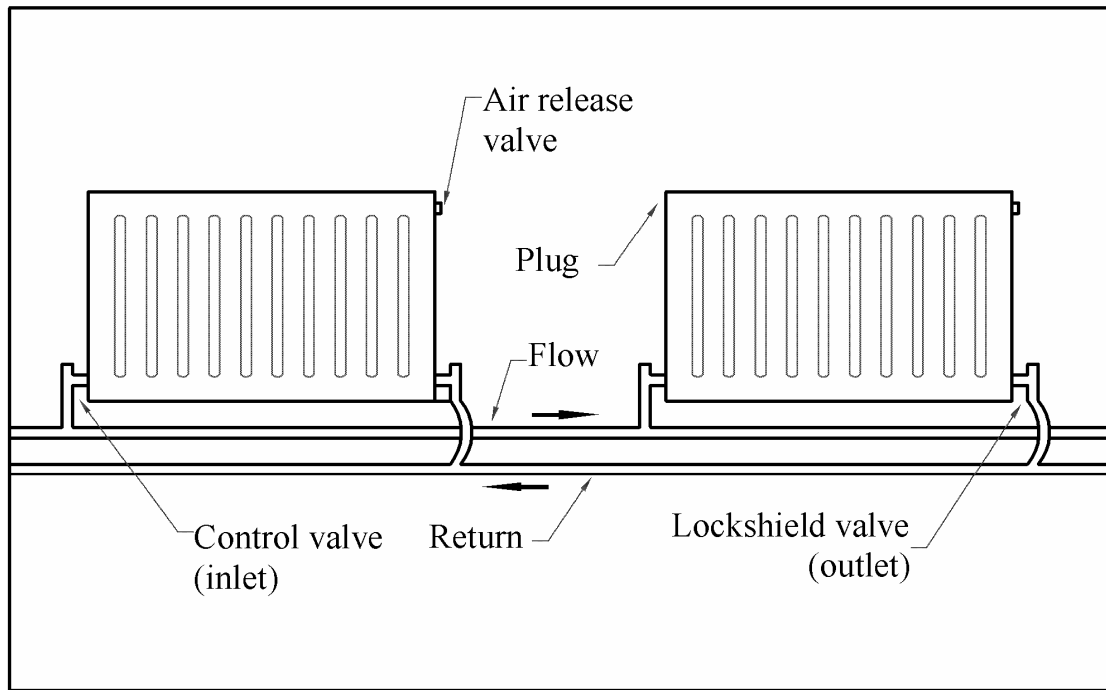
Safety precaution 1.	4
Valid reason.	2
Safety precaution 2.	4
Valid reason.	2

Placing a ladder against an external wall.

Safety precaution 1.	4
Valid reason.	3
Safety precaution 2.	4
Valid reason.	3

Total =50 Marks.

Question 6.



(b)

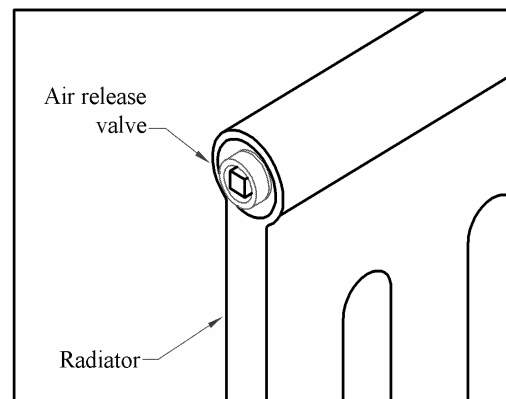
Two advantages of installing a two-pipe central heating system.

- q Each radiator receives hot water at approximately the same temperature.
- q The two-pipe system provides a faster warm up.
- q This system allows for greater control of each radiator.
- q Individual radiators can be turned off or on without a significant heat loss.
- q It is easier to balance the system.

©

Air release valve or Air bleed valve.

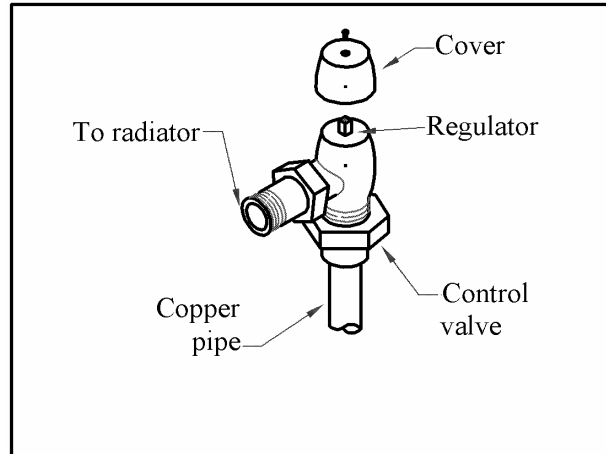
- q The valve is located at the top of the radiator.
- q It allows trapped air to be released.
- q If the radiator contains air it will not fill properly and will not perform to full effect.
- q A special key is used to vent the radiator at this point.



Control valve.

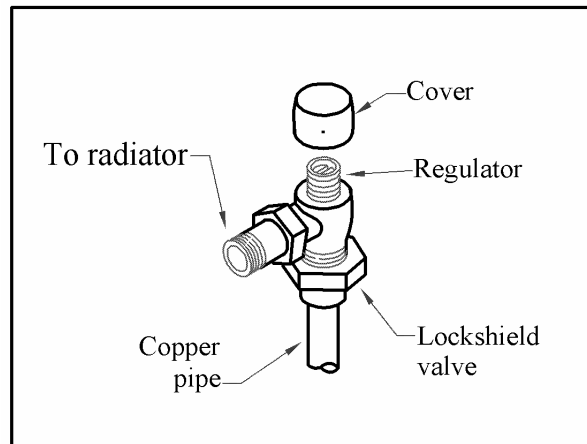
Question 6 cont.

- q This valve is used to turn the radiator on or off.
- q By adjusting the valve, the flow of water through the radiator can be controlled.
- q Used in conjunction with the lockshield valve it may be used to remove the radiator for repairs or re-decoration of the wall behind.
- q The valve is fitted on the inlet end of the radiator.



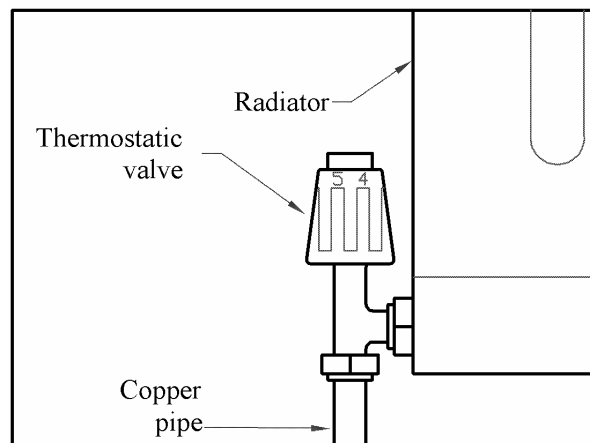
Lockshield valve.

- q Can be used to open or close the supply. This is called 'balancing the system'
- q By adjusting the valve, the flow of water through the radiator can be controlled.
- q The valve is generally adjusted with a screwdriver or allen key.



Thermostatic valves.

- q The valve senses the temperature of the room and allows hot water to flow through the radiator until the required temperature is reached.
- q The valve allows control of individual rooms.
- q The valve is very useful for controlling the temperature in bedrooms or rooms that are not used on a regular basis.



- q The settings on the valve range from 1 to 5 or from 10° to 28 °C

Question 6.

Details:

Marks.

Part (a).

Radiator one.	4
Radiator two.	4
Pipe one.	4
Pipe two.	4
Connection to pipe one	4
Connection to pipe two.	4

Quality of sketch.	6
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Part (b).

List two advantages of two-pipe system.

Advantage one.	5
Advantage two.	5

Part (c).

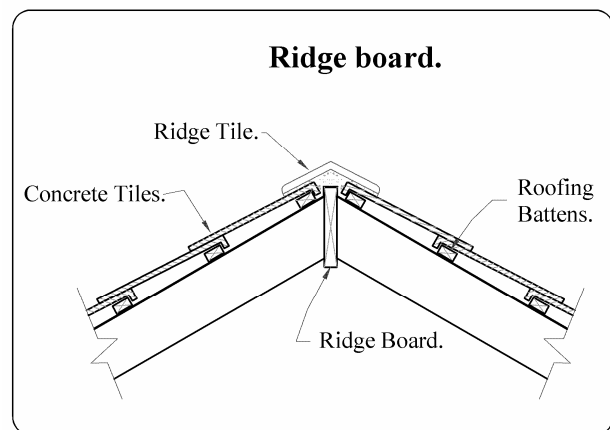
Sketch of valve.

Primary communication of relevant information.	6
Other communication of relevant information.	4

Question 7.

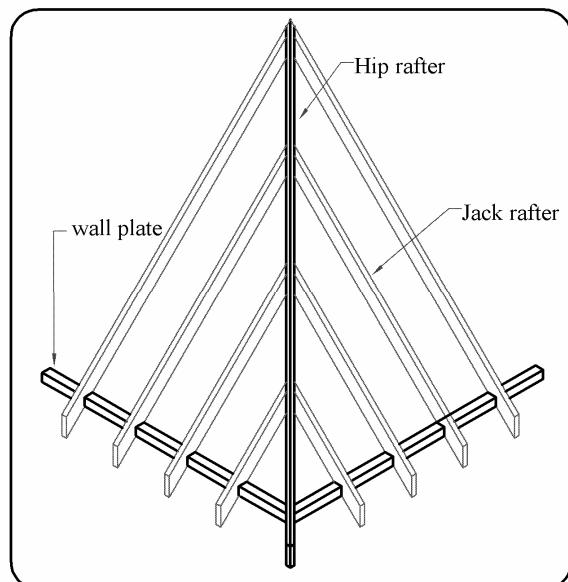
Ridge board:

- q This is the horizontal member at the top of the roof.
- q The tops of the rafters fit against it and are nailed to each other at this point.
- q The section size varies from 150x25 to 175x25.
- q Ridge board is generally made of softwood and treated with preservative.



Hip rafter:

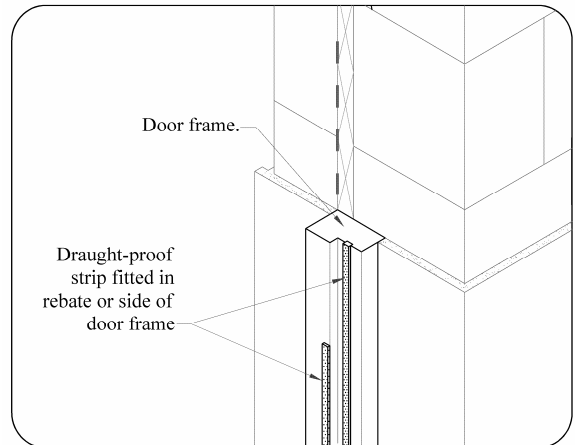
- q This rafter forms the hip and spans from the ridge to the eaves.
- q It is stronger than the common rafter and the jack rafters are fixed to it.
- q Considerable pressure is exerted on the rafter and using an angle tie across the corner strengthens the roof.
- q Section size varies depending on the roof size.



Question 7 cont.

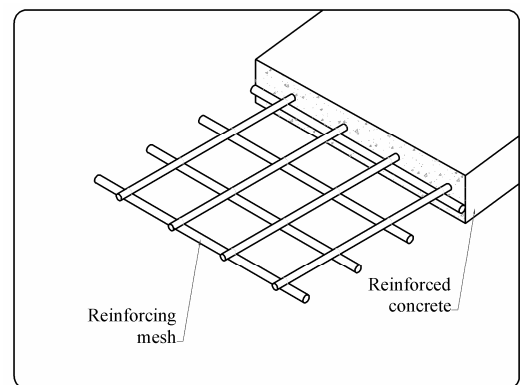
Draught-proof strip:

- q This is a special fitting fixed to an external door to prevent draughts.
- q These special strips are available through hardware shops.
- q The strips are standard on most new doors and windows.
- q Special adhesive strips are also available.
- q Aluminium and plastic strips are used as well.



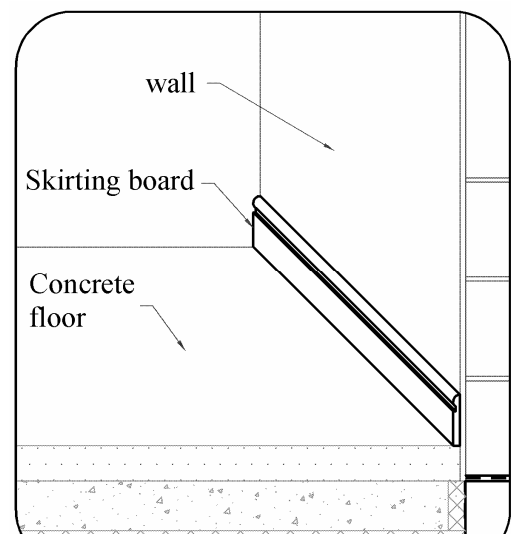
Reinforcing mesh:

- q This is steel reinforcement in grid form and is used when large areas of concrete are being cast.
- q It is particularly useful when concrete floors or raft foundations are being put in place.
- q The steel mesh is available with the bars welded together.
- q Diameter of the bars may vary from 6mm to 25mm.



Skirting board:

- q The skirting board is the decorative finish fixed to the base of walls within dwelling houses.
- q It acts as a neat finish at the junction of wall and floor.
- q Skirting boards may be made of softwood or hardwood.

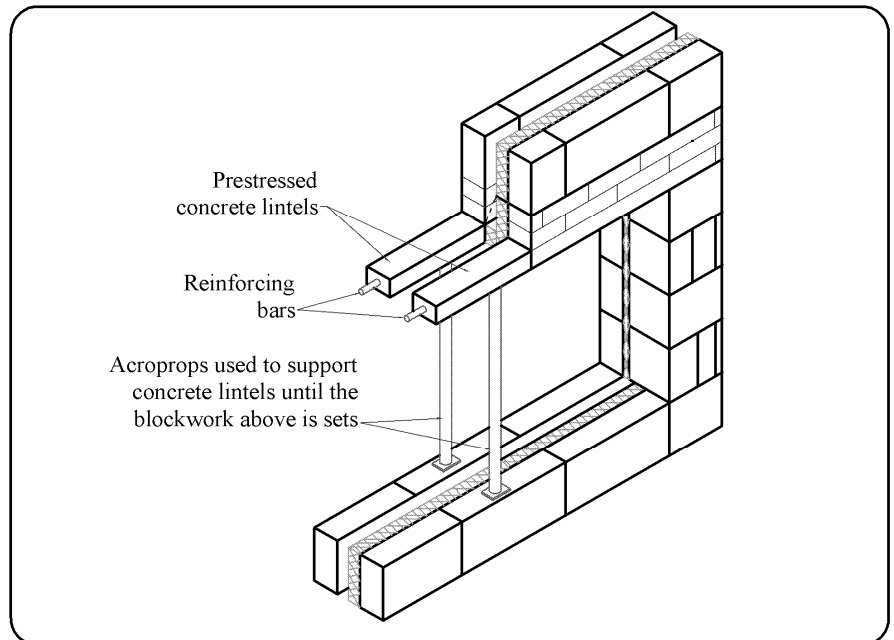


- q A wide variety is available with many different profiles to suit differing situations.

Question No 7 cont.

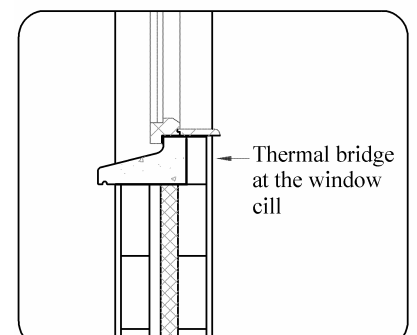
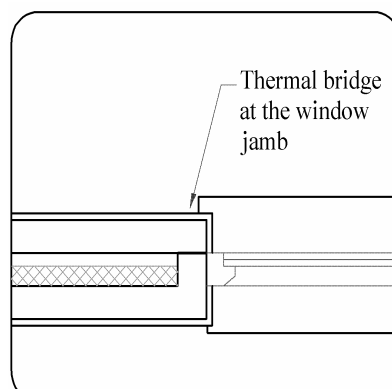
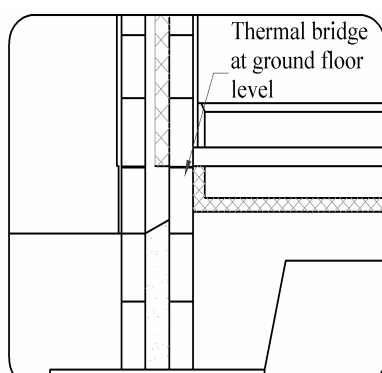
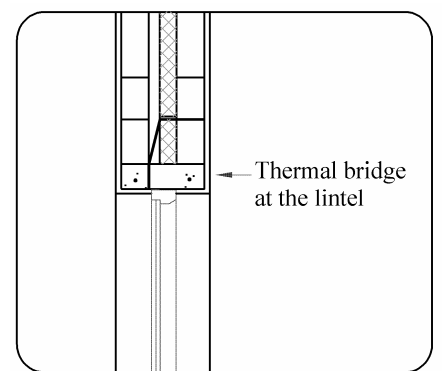
Prestressed concrete lintel:

- q These are prestressed concrete units used to span window or door openings.
- q They are available in various sizes and are ready made.
- q The most common section width is 100x65.
- q This type of lintel is widely used and speeds up the construction of buildings.



Thermal bridge:

- q This is an area of a building where the heat flow is higher than through other areas.
- q A thermal bridge will occur at openings in external walls when cavities are bridged with materials of poor insulating value.
- q Thermal bridges lead to increased energy costs, as heat is lost at these points.
- q Thermal bridges may also lead to condensation forming on the internal surface of external walls.



Question 7.

Details:

Marks.

Primary communication of relevant information	6
Other communication of relevant information	4

Primary communication of relevant information	6
Other communication of relevant information	4

Primary communication of relevant information	6
Other communication of relevant information	4

Primary communication of relevant information	6
Other communication of relevant information	4

Primary communication of relevant information	6
Other communication of relevant information	4

Total = 50 marks

Question 8.

(a)

Planning Permission

Planning permission is required before any building is constructed in an urban or rural area. The reasons for applying are as follows:

- It is a legal requirement.
- Council or Corporation must be aware of any development taking place within their area.
- Building development must be in line with the development plan.

Full Planning permission

- Residents of an area must be made aware of any developments being undertaken in their environment.

(b)

Full Planning permission means that a person or company may carry out new development or reconstruct an existing building according to the Plans and specification submitted. It gives clear permission for the proposed development to go ahead subject to the conditions laid down by the Authority.

(c)

Terms relating to Planning Permission

• Site Notice:

This is a clear notice placed at the proposed entrance to the site. The notice should be A4 size and positioned 1.5m above ground level and be clearly visible. The notice must be erected on site during a two week period before application is made and must remain in place for five weeks after the planning authority receives the application.

The notice must contain the following information:

- Date that the site notice was erected.
- The name of the planning authority.
- The name of the townland and the postal address.
- Type of permission being applied for.
- A brief description of the proposed development.
- Details of where the application can be inspected.
- Notice that observations may be made within a 5 week period.
- Applicant or agent must sign the notice
- The sign must be replaced if it is damaged or becomes illegible.

• Site Location Map:

This map gives the location of the site. It must show the following:

- Outline of the site in red.

- q O.S. sheet number.
- q North point.
- q Scale of the map. (1: 2500).
- q The map must be an original copy or permission must be obtained from OS.

Question 8 cont.

· Percolation Test:

This test is used to determine the percolating property of the soil and from the results the size of the percolating area may be calculated. The test consists of the following procedures.

- q Test holes measuring 0.3m x 0.3m x 0.4m deep are dug below the invert level of the percolating pipe.
- q 50 litres of water are required for the test.
- q The clear water is poured into the holes to a depth of 300 and this depth should be maintained until the subsoil becomes saturated.
- q Once saturated, the time required for the water to drop 100mm is recorded.
- q This time expressed in minutes divided by 10 is the time for the water to drop 25mm and is the percolation value T.

· Newspaper Notice:

This is a notice printed in a newspaper circulating within the area. A number of important points are given below in relation to such notice.

- q A newspaper notice must be published in the two week period prior to the application being made.
- q The planning authority must receive the application within two weeks of the publication of such notice.
- q Type of application must be specified.
- q Location where the application may be inspected or purchased.
- q The notice should state that an observation may be made on the payment of a fee.
- q Each planning authority will give a list of approved newspapers.

· Site Layout map:

This is a map showing the proposed layout of the buildings on a site. The map is to a scale of 1: 500. The map must show the following:

- q Proposed and existing buildings along with roads and the boundary.
- q Distances of buildings from roads and boundaries.
- q Water supply and sewage systems.
- q Floor levels.
- q Entrance to the main road.
- q Position of site notice.
- q North point and scale.
- q Name of architect or engineer who prepared the map.

Question No. 8

(a)

Reasons for Planning

Valid reason 1	5 Marks
Valid reason 2	5 Marks

(b)

Explain Full Planning Permission:

Valid detail 1	5 Marks
Valid detail 2	5 marks

(c)

Description of three headings:

Term 1

Valid point 1	5 marks
Valid point 2	5 marks

Term 2

Valid point 1	5 marks
Valid point 2	5 marks

Term 3

Valid point 1	5 marks
Valid point 2	5 marks

Question 9.

(a)

The advantages of thermal insulation in the construction of a dwelling house are as follows:

- q Saving on the amount of energy needed to maintain thermal comfort.
- q Thermal insulation keeps internal surfaces warm and reduces the danger of condensation.
- q Thermal insulation eliminates the cold bridge effect at window and door openings.
- q Thermal insulation reduces the overall U-value giving an improved energy rating.
- q Lower U-value increases the value of the house and energy ratings will be part of house purchase in the near future.
- q Insulation of floors reduces heat loss to the ground resulting in improved comfort for the occupants.
- q Insulation used in the attic space reduces heat loss through the roof with resultant comfort and savings.
- q With the use of Thermal insulation we are taking care of our environment and helping to conserve energy.

(b)

The following materials may be used to provide thermal insulation:

- q Fibre Glass quilt.
- q Glass Fibre batt.
- q Expanded Polystyrene board.
- q Polystyrene particles.
- q Lightweight aggregates.
- q Polyurethane Board.

(c)

Locations for insulations:

Walls:

- q Thermal Insulation is used in cavity walls.
- q It is usually fitted within the cavity.
- q It may be fitted as part of a dry lining system.
- q Insulation is fitted at door and window openings.

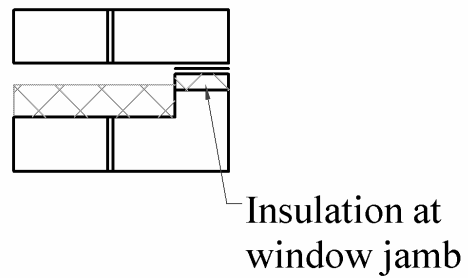
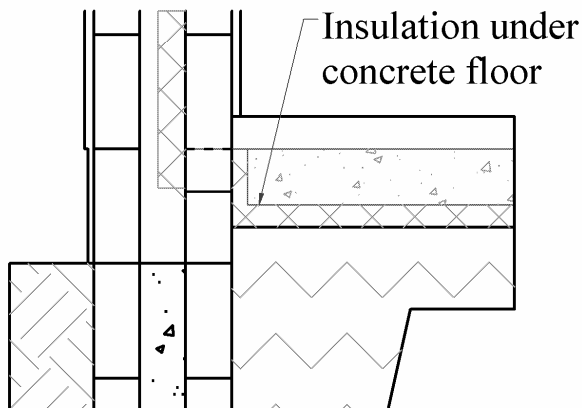
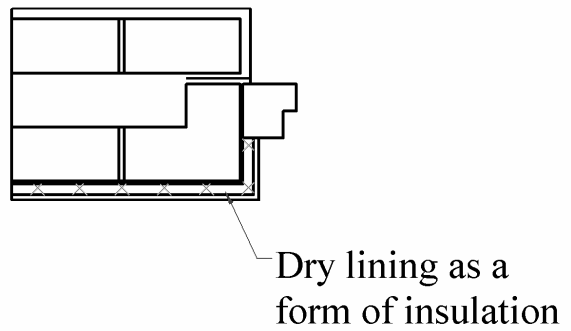
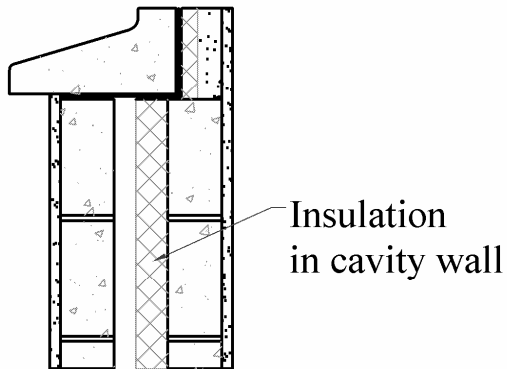
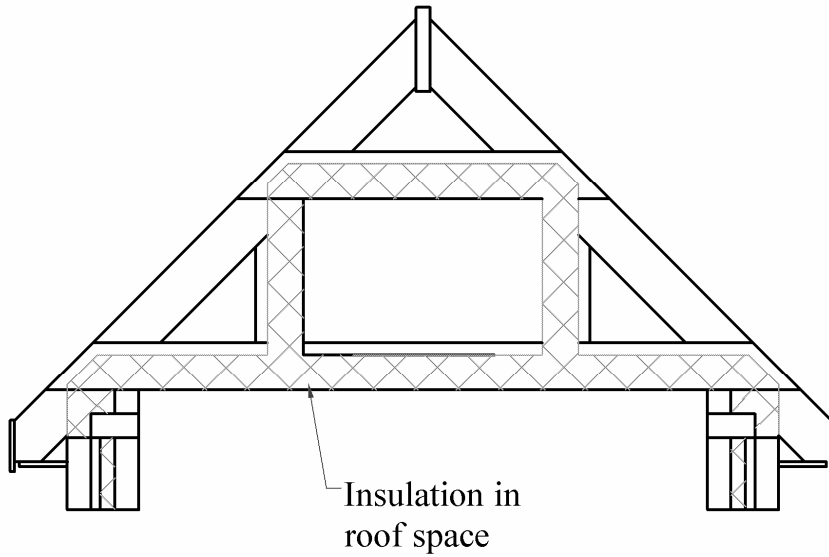
Floors:

- q Thermal insulation is fitted as part of solid ground floors.
- q It is used in suspended ground floors.
- q Insulation is also used in ground floors.

Roofs:

Question 9.

- q Thermal insulation is used in the attic space of pitched roofs.
- q It is used in dormer roof construction.
- q Insulation is used in flat roof construction.



Question 9.

Insulation

Discuss Advantages of Insulation:

Advantage 1.

Marks.

Valid detail 1	4
Valid detail 2	4

Advantage 2

Marks.

Valid detail 1	4
Valid detail 2	4

Materials:

Marks.

Material 1	5
Material 2	5

Location No. 1

Marks.

Primary communication of relevant information.	8
Other communication of relevant information.	4

Location No. 2

Marks.

Primary communication of relevant information.	8
Other communication of relevant information.	4

Total = 50 marks.