



Leaving Certificate Examination 2005

Construction Studies

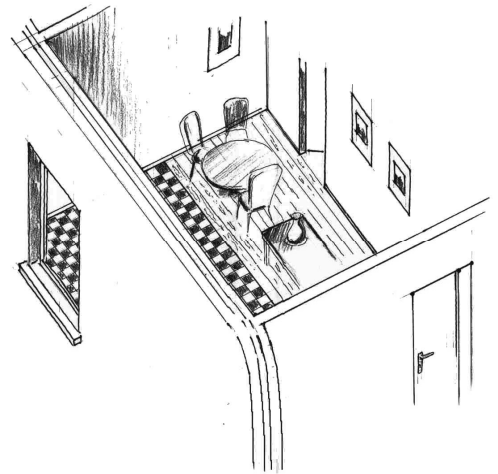
Theory - Higher Level

(300 Marks)

Wednesday 22 June
Afternoon, 2.00 to 5.00

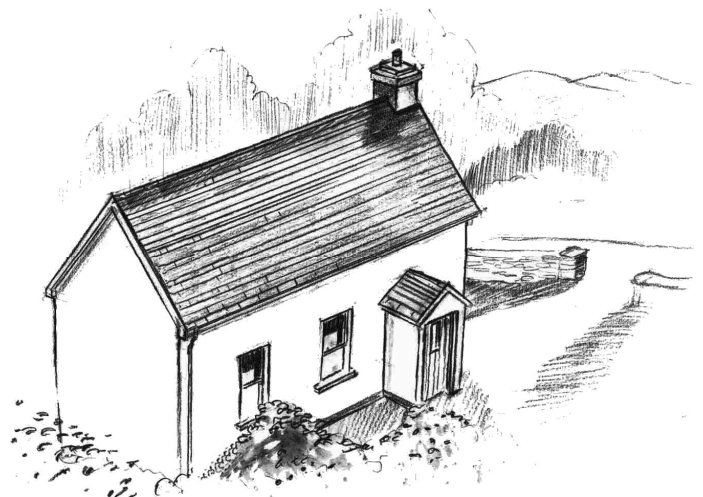
- (a) Answer **Question 1** and **four** other questions.*
- (b) All questions carry equal marks.*
- (c) Answers must be written in ink.*
- (d) Drawings and sketches to be made in pencil.*
- (e) Write the number of the question distinctly before each answer.*
- (f) Neat freehand sketches to illustrate written descriptions should be made.*
- (g) The name, sizes, dimensions and other necessary particulars of each material indicated must be noted on the drawings.*

1. The sketch shows a combined kitchen and dining space in a single storey dwelling house. The external wall is a standard 300mm concrete block wall with an insulated cavity. The kitchen space has a solid concrete floor with a tiled finish and the dining space has a suspended timber floor.



- (a) To a scale of 1:10, draw a vertical section through the external wall and ground floor of the house showing both floor constructions. The section should show all the constructional details from the bottom of the foundation to 400mm above finished floor level and include the abutment of both floors.
(For the purposes of this drawing, show a minimum 1.5 metres width for each floor type)
- (b) Indicate on the drawing a design detail to show the cross ventilation of the suspended timber floor through the solid concrete floor.
2. Current building regulations require that new dwelling houses be suitable for all, including wheelchair users.
- (a) Using notes and freehand sketches, outline **three** areas in a dwelling house that need specific consideration to ensure that the house is suitable for a person in a wheelchair.
- (b) Select one of the areas outlined at (a) above and using notes and detailed freehand sketches, show **three** specific design considerations that ensure that the space selected is suitable for a wheelchair user.
3. A small rural dwelling house in the vernacular tradition, built in the 1950s, is shown in the accompanying sketch. As part of a general restoration of the house it has been decided to renew the roof of the house and to incorporate bedroom accommodation within the attic space. A survey of the house reveals:

- Traditional cut roof with original natural slate;
- Softwood fascia and soffit;
- External uninsulated cavity walls of concrete block construction;
- Solid block internal walls.



- (a) Using notes and detailed freehand sketches, show the constructional details of the roof structure to facilitate bedroom accommodation within the attic space. Indicate sizes for all roofing components. Show details of the insulation requirements for both walls and roof.
- (b) Using notes and freehand sketches, outline **one** method of providing natural light to the bedrooms in the attic space in a manner that will respect the character of the original house. Discuss **two** advantages of your preferred method of providing natural light to the bedrooms.

4. A new two-storey house has load-bearing and non load-bearing timber stud partitions. The house has a solid concrete ground floor and a suspended timber first floor.
- (a) Using notes and detailed freehand sketches, compare the design detailing for the construction of each of the following:
- (i) a load-bearing partition to support the first floor joists;
 - (ii) a non load-bearing partition on the first floor.
- (b) Using notes and freehand sketches, show **two** design details that ensure that the transmission of sound is reduced through the stud partition constructed on the first floor.

5. An extension to a dwelling house has a concrete flat roof with an asphalt finish. The total roof surface is 16m^2 in area.
The roof is constructed to the following specification:

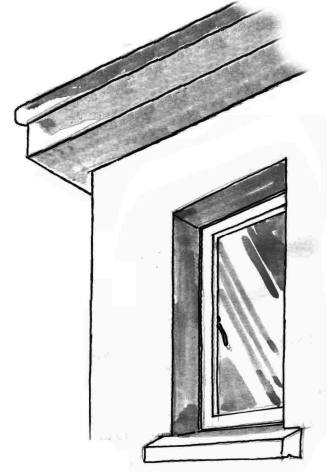
(i)	Concrete flat roof slab:	Thickness 175mm
(ii)	Concrete screed:	Thickness 60mm
(iii)	Layer of asphalt:	Thickness 20mm
(iv)	Internal plaster to roof slab:	Thickness 15mm

Thermal data of roof:

Resistivity of asphalt	1.250	m °C/W
Resistivity of concrete screed	0.710	m °C/W
Resistivity of concrete roof slab	0.690	m °C/W
Resistivity of the plaster	2.170	m °C/W
Resistance of the internal surface (R)	0.104	$\text{m}^2 \text{°C/W}$
Resistance of the external surface (R)	0.413	$\text{m}^2 \text{°C/W}$
External temperature	11°C	
Internal temperature	21°C	

- (a) Calculate the U-value of the roof structure and the overall heat loss through the roof.
- (b) Outline **two** design considerations that must be taken into account in the design of a roof for a domestic dwelling and describe, with the aid of notes and freehand sketches, the design detailing for **each** consideration outlined.
6. (a) Draw a single line diagrammatic sketch of the cold water distribution system for a two-storey house. The diagram should show all the design details from the mains supply and include the distribution to the kitchen sink and bathroom. The bathroom includes:
- (i) water closet (WC);
 - (ii) wash hand basin;
 - (iii) bath.
- (b) Include in the proposed layout all the necessary valves and suggest suitable dimensions for all pipework.
- (c) Using notes and detailed freehand sketches, show **two** design details that regulate the level of water in the storage tank and explain the design principles of each.

7. A stormproof casement window, as shown in the accompanying sketch, is made from softwood and has a double-glazed outward opening sash. The window is one metre in height and is fixed in a standard 300mm external concrete block wall with insulated cavity. The wall is plastered on both sides.

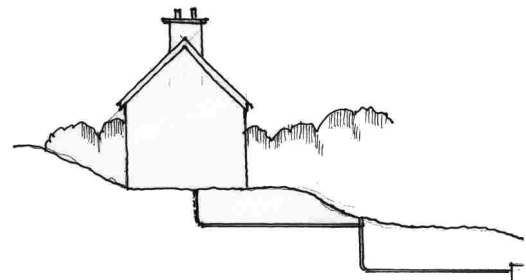


- (a) To a scale of 1:5, draw a vertical section through the window frame and opening sash. Show all the constructional details from 300mm below the concrete cill to 200mm above the top of the window frame.
- (b) Using notes and freehand sketches, show the design details necessary to prevent the formation of condensation on the inner wall surfaces surrounding the window.

8. A properly designed and constructed sewerage system is essential for the safe removal of waste from a domestic dwelling.

- (a) Describe in detail, using notes and freehand sketches, **three** necessary considerations in the design and installation of a sewerage system from a domestic dwelling to either the main sewer or septic tank.
- (b) The accompanying sketch shows a house situated on a sloping site. When designing the sewerage system a backdrop manhole is necessary to achieve the correct gradient.

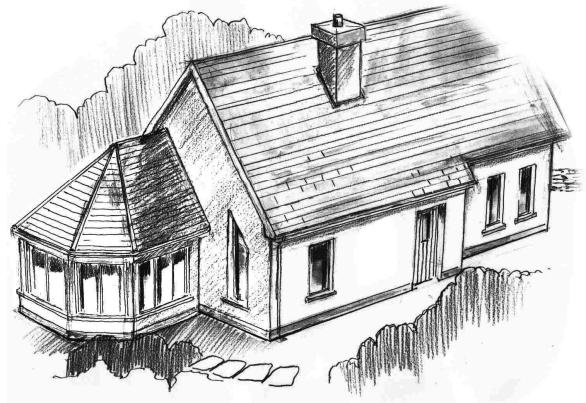
To a scale of 1:10, draw a sectional elevation through the backdrop manhole. The depth from the top of the manhole to the invert level is 1800mm. Show and label all necessary design details.



9. Timber frame construction is now widely used for domestic dwellings in Ireland.

- (a) To a scale of 1:10, draw a vertical section through the external wall and ground floor of a house of timber frame construction. The top of a window cill is positioned 900mm above floor level, the external leaf is of standard concrete block construction with a rendered finish and the ground floor is a solid concrete floor with 20mm quarry tile finish. Show all the constructional details from the bottom of the foundation to the top of the concrete cill.
- (b) Discuss in detail **two** advantages of timber frame construction and **two** advantages of standard concrete block wall construction and recommend a preferred wall type for a new house.

10. The accompanying sketch shows a house with a sunspace included as shown.
- (a) Discuss **three** advantages of including a sunspace, such as that shown in the sketch, in the design layout of a house.
 - (b) Using notes and sketches, show your preferred orientation for the house and sunspace shown. Outline **two** reasons to support your choice of orientation. (*Indicate clearly the direction of North on your sketch*).
 - (c) Using notes and sketches, outline **two** design considerations to ensure that optimum thermal benefit is gained from the inclusion of a sunspace.



OR

10. The centres of cities and towns have been subject to depopulation, with a consequent fraying of the urban fabric. The trend towards less intensive urban patterns together with the increasing separation between home, work and town centre have exacerbated the growth in private car transport. This has led to increased energy use and emissions of air pollutants and has militated against the effectiveness of public transport networks.

Ireland's Environment 2004
Environmental Protection Agency (epa);

Discuss the above statement and outline **three** recommendations to the planning authorities which would aid the renewal of the centres of cities and towns.

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