

AN ROINN OIDEACHAIS AGUS EOLAÍOCHTA
LEAVING CERTIFICATE EXAMINATION, 2002

CONSTRUCTION STUDIES - PART I (THEORY)

HIGHER LEVEL

WEDNESDAY, 20 JUNE - AFTERNOON 2.00 p.m. to 5.00 p.m.

(300 marks are allotted to this paper.)

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

1. An open fireplace in a single storey dwelling is located on a 300mm external concrete block wall with an insulated cavity. The house has a solid concrete floor.
 - (a) To a scale of 1:5 draw a vertical section through the wall and fireplace. The section should show all the constructional details from bottom of the foundation to the top of the first flue.
 - (b) Note on the drawing **two** design details that ensure the efficient functioning of the fireplace.

2. Poor design detailing can result in condensation occurring on the inner surfaces of external cavity walls, particularly at (i) wallplate level and (ii) the wall surrounding window and door openings.
 - (a) Discuss how condensation might occur at locations listed above and using notes and freehand sketches show the correct design details that would prevent the condensation occurring at (i) and (ii) above.
 - (b) Condensation may also occur on the internal surfaces of the walls of an old house. Discuss **two** possible reasons for its occurrence and using notes and freehand sketches, show **two** means by which its occurrence might be eliminated.

3.
 - (a) Discuss the importance of the use of steel in the manufacture of reinforced concrete, with reference to the:
 - (i) strength properties of both materials;
 - (ii) design considerations to avoid deterioration over time.
 - (b) Describe in detail, using sketches and notes, three methods of combining concrete and steel in the manufacture of concrete lintels.
 - (c) List **one** advantage of each method described (b).

4. A house built twenty five years ago has an external cavity wall built to the following specification:

Outer Leaf: 100mm concrete block with 19mm cement rendering.
 Cavity: 100mm uninsulated
 Inner Leaf: 100mm concrete block with 16mm plaster finish.

Wall data:

Thermal conductivity of the rendering and the plaster is $0.46\text{W/m }^\circ\text{C}$.
 Conductivity of the blockwork is $1.44\text{W/m }^\circ\text{C}$.
 Resistance of the external surface is $0.055\text{m}^2\text{ }^\circ\text{C/W}$.
 Resistance of the internal surface is $0.123\text{m}^2\text{ }^\circ\text{C/W}$.
 Resistance of the cavity is $0.18\text{m}^2\text{ }^\circ\text{C/W}$.

 - (a) Calculate the U-value of the wall.
 - (b) A proposed extension to the house is to have external walls of similar construction to the original, with the addition of expanded polystyrene insulation in the cavity. Calculate the thickness of insulation needed to achieve the “U-value” of $0.45\text{W/m}^2\text{ }^\circ\text{C}$, given the thermal conductivity, (k-value) of expanded polystyrene is $0.033\text{W/m }^\circ\text{C}$.
 - (c) Describe in detail, using notes and freehand sketches, two methods that might be employed to reduce the thermal transmittance coefficient, “U-value”, of the existing walls.

5. Trial holes indicate that the site, on which a house is to be built, has a loose gravel subsoil.
- Discuss in detail the considerations governing the choice of foundation for this house.
 - Describe, with the aid of notes and detailed sketches, **two** types of foundation that would be suitable for the house.
 - In the case of each type of foundation selected, state clearly **two** reasons why it is considered suitable.
6. (a) Discuss sound insulation in buildings with reference to each of the following:
- Mass;
 - Completeness;
 - Isolation.
- (b) A living room is located on the first floor of a new house, directly above a bedroom. The floor consists of tongued and grooved flooring boards on wooden joists with a plasterboard ceiling beneath.
Using notes and sketches, show **two** design details that will increase the sound insulation properties of the floor and minimise the transmission of noise to the bedroom beneath.
7. Sewage treatment and disposal are to be provided for a new house, situated in a rural area.
- Discuss in detail **four** considerations that must be fulfilled to ensure that the site is suitable for the location of a sewage treatment unit.
 - Using notes and freehand sketches, explain in detail **three** considerations in the design of a septic tank system that ensure the safe processing and disposal of waste.
8. It is proposed to extend the kitchen area of an existing two-storey house. This requires the construction of a timber flat roof to the extension. The external wall of the house is a 300mm insulated cavity wall.
- To a scale of 1:5, show the design details of the roof construction at:
 - eaves level, showing how the rainwater is to be removed.
 - the abutment of the flat roof with the wall of the existing house.
 - Using notes and sketches show two design considerations in the roof construction which prevent the occurrence of:
 - Condensation within the roof structure;
 - Decay of the roof timbers.
9. A loadbearing, timber stud partition with a plaster finish separates a dining room and a living room in the ground floor of a two storey house.
- Using notes and freehand sketches, describe in detail, the construction of the partition.
 - Show clearly the design details necessary to accommodate a standard flush panel door.
 - Label and give the sizes of each of the components of the partition.
 - Discuss in detail the advantages and disadvantages of using either a timber stud partition or a concrete block partition wall.

10. In recent years the increase in the building of individual houses in the countryside is causing some debate.

(a) What arguments might be presented by:

(i) a person who wants to live in the country and is seeking to build a one-off house in the countryside and

(ii) a person who is objecting to the building of one-off housing and is seeking to maintain the traditional appearance of the countryside.

(b) Evaluate the arguments presented at (a) and (b) above and make a recommendation.

OR

“Good builders were very conscious of the outward appearance of their work and took care to improve and enhance it, while the use of purely local materials always ensured that the finished structure fitted smoothly into its environment, and did not shock it or do violence, as do some misguided efforts of ‘modern’ fashion in building.”

Irish Country Households (1985) : *Kevin Danaher*

Discuss.