



*Pre-Leaving Certificate Examination, 2009*

# *Construction Studies*

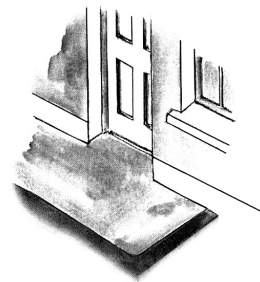
## *Theory - Higher Level*

*(300 Marks)*

*Time: 3 Hours*

- (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. Shown in the accompanying sketch is a hardwood front door. The door is fixed into a standard 300 mm external block wall with an insulated cavity. The house has a solid concrete ground floor.



- (a) To a scale of 1:5, draw a vertical section through the door showing the threshold, door, door frame and head detail. The section should show 300 mm below the bottom of the door and 300 mm above the head of the door.
- (b) Indicate clearly on the drawing the specific design detailing that ensures rainwater is removed from the threshold area and does not penetrate to the inner surfaces surrounding the door.

2. (a) Identify **two** possible risks to personal safety associated with **each** of the following:

- (i) carrying out deep excavation on a building site;
- (ii) erecting scaffolding around a building;
- (iii) applying wood preservatives to timber.



- (b) Using notes and *freehand sketches*, outline **two** safety procedures that should be observed to eliminate **each** risk identified at (a) above.
- (c) Under Health and Safety guidelines all construction companies must produce a Health and Safety document. Write a brief note outlining **three** guidelines in this document.

3. A new double-glazed window is to be fitted into the kitchen of an old house.

- (a) Using the following data, calculate the U-value for the new window:

New window:	height	1.5 m
	length	4.0 m
Glass: double glazing	thickness	5 mm
Space between panes	width	10 mm

***Thermal data of glazing:***

Conductivity of glass	(k)	1.02 W/m °C
Resistance of internal surface of glass	(R)	0.12 m <sup>2</sup> °C/W
Resistance of external surface of glass	(R)	0.08 m <sup>2</sup> °C/W
Resistance of airspace between glass	(R)	0.15 m <sup>2</sup> °C/W

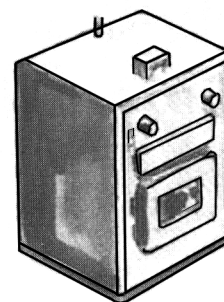
- (b) Calculate the rate of heat loss through the window when there is a difference of 20 degrees between the inside and the outside temperatures.
- (c) Using notes and *freehand sketches*, describe correct detailing that would ensure there was no thermal bridge at the:
- (i) head of the window;
  - (ii) cill of the window.

4. A oil boiler is used as the heat source to provide hot water and central heating in a two storey house.

(a) Using notes and a *single-line diagram*, show a typical pipework layout required to provide heating and hot water in the dwelling.  
Include **two** radiators on ground floor and **three** radiators on first floor.

(b) Indicate on the drawing **three** necessary valves to ensure safe running of the system and write a short note explaining their function.

(c) Outline **three** design details for a system to ensure economic use of fuel.



5. The development of plastic has seen many products of this material used widely in the construction industry today

Using notes and *freehand sketches* where appropriate write a detailed note on the following:

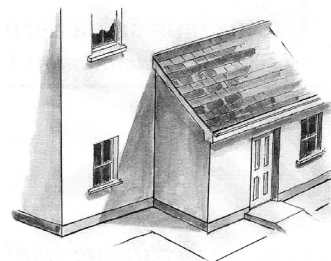
- (i) types of plastic;
- (ii) properties of plastics;
- (iii) **five** areas where plastic products are used in a new house construction.

6. A new porch 1.7 m wide has been added to the rear of an existing house. The roof is slated/lean-to type and pitched at 30 degrees. The walls of the extension are standard 300 mm concrete block walls with insulated cavity. The walls are rendered on the outside and plastered on the interior. A horizontal ceiling of plasterboard is fitted.

Draw to a scale of 1:5 a vertical section through the lean-to roof.

The section should show:

- (i) all construction details from 300 mm below the ceiling joists;
- (ii) all construction details from 300 mm above the abutment.

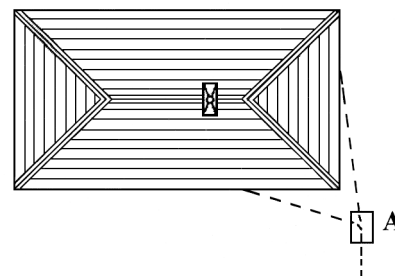


7. A properly designed and constructed sewage system is essential for the safe removal of waste from a domestic house in a rural area.

(a) Describe **three** hazards that could occur if this system is not properly designed.

(b) Using notes and *freehand sketches*, show **three** considerations that should be taken into account when laying sewer pipes to ensure the safe removal of waste from a dwelling.

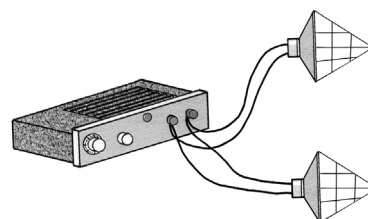
(c) Using notes and *freehand sketches* outline **two** tests that may be carried out on an underground drainage system to test air-tightness.



8. (a) Using notes and *freehand sketches*, explain the following:

- (i) sound absorption;
- (ii) sound reflection;
- (iii) reverberation time.

(b) An upstairs bedroom equipped with a music system is to be renovated. The floor is tongued and grooved flooring supported on timber joists with plasterboard ceiling.



Using notes and *freehand sketches*, show **three** design details that will improve the sound insulation properties of the room.

9. Recent research has indicated that condensation is a greater problem in modern houses than in houses built more than twenty years ago.

(a) Explain what is meant by each of the following terms:

- (i) interstitial condensation;
- (ii) surface condensation;
- (iii) dew point.

(b) Outline the main causes of condensation in a building. Using notes and *freehand sketches*, outline the measures that should be taken to prevent condensation occurring.

10. A building of architectural merit is threatened with destruction to facilitate the construction of a ring road around a small village.

(a) What arguments might be presented in favour of:

- (i) preservation of the old building;
- (ii) construction of new motorway?

(b) Make a recommendation to the planning authority on this proposal and give **three** reasons in support of your recommendation.



**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 mitigated against the effectiveness of the public transport networks.”

**Ireland’s Environment, 2004**  
*Environmental Protection Agency (epa);*

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

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