Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2004

Construction Studies

Theory - Higher Level

(300 Marks)

Wednesday 23 June
Afternoon, 2.00 - 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. A small porch, which projects 1.7m from a house, is shown in the accompanying sketch. The lean-to roof is slated and has a pitch of 30 degrees. The house and porch are constructed of standard 300mm concrete block walls with insulated cavity. The porch has a level plasterboard ceiling.

(a) To a scale of 1:5 draw a vertical section through the porch showing the roof and wall of the house. The section should show all the construction details from 400mm below the bottom of the ceiling joists to 300mm above the abutment of the roof and wall of the house.

(b) Indicate on your drawing **two** design details that ensure moisture does not penetrate at the abutment of the roof and wall of the house.

2. A bathroom in a new single storey dwelling house measures 3m x 2.5m and has two adjacent external walls. The bathroom is to be suitable for a person in a wheelchair.

(a) Using a well-proportioned line diagram ***or*** freehand sketch, propose a design layout for this space, indicating the location you would choose for each of the following:

- Door
- Water closet (WC)
- Bath ***or*** shower facility
- Window
- Wash hand basin

(b) In the case of each item listed above, discuss in detail two reasons for the chosen location.

(c) Using notes and detailed freehand sketches, outline **two** other design considerations that would make the bathroom space user friendly for a person in a wheelchair.

3. **(a)** Using notes and freehand sketches, describe the application of an external render to the walls a new house of concrete block construction. Give details of materials, mix proportions and sequence of coats required.

(b) The original external render of an old house is to be removed to reveal solid stone walls of random rubble construction, as shown on the sketch. The owner has the option of either leaving the external stonework exposed ***or*** of replastering the walls.

Outline **two** reasons in favour of **each** option listed above.
Recommend a preferred option and give **two** reasons to support your recommendation.

(c) If the house is to be replastered, a 1 lime : 3 sand mix is recommended for the external render. Give **two** reasons why such a mix is recommended for this house.

4. An oil-fired boiler is used as a heat source to provide central heating and hot water in a two-storey dwelling house.

(a) Using a single line diagram, show a design layout for the heating and domestic hot water system. Include three radiators on the ground floor and three radiators on the first floor.

(b) Using notes and sketches describe **three** safety features that are incorporated into the design of an oil-fired boiler to ensure its safe functioning.

(c) Many modern heating systems are designed to allow independent control of different heating zones within a house. Discuss, in detail, **three** advantages of installing a zoned heating system.

5. The roof of a domestic dwelling house built in the 1970's is insulated with a 100mm glass fibre quilt placed between the ceiling joists. It has been decided to increase the level of insulation in the roof to achieve a U-value of 0.16 W/m^2 °C.

This U value may be achieved by either:

(i) increasing the thickness of glass fibre ***or***
(ii) using urethane board.

Thermal data:

U-value of the existing roof		0.35	W/m^2 °C.
Conductivity of glass fibre quilt	(k)	0.04	W/m °C.
Conductivity of urethane board	(k)	0.023	W/m °C.

(a) Calculate the thickness of the (i) glass fibre quilt and (ii) urethane board required to achieve the U-value of 0.16 W/m^2 °C.

(b) Evaluate both methods of insulation listed at (i) and (ii) above.
Based on this evaluation recommend a preferred method of insulation.

(c) Using notes and sketches, show **two** design details that ensure adequate ventilation of the roof space is maintained when the additional insulation is put in place.

6. Inadequate treatment and disposal of sewage creates environmental and health hazards.

(a) Describe **three** hazards that could occur in a sewage treatment and disposal system of an individual house, situated in a rural area, if the system is not properly designed.

(b) Using notes and sketches show how proper design detailing would prevent each of the hazards described at (a) above.

(c) Outline **three** considerations to be taken into account when selecting a site for a house in a rural area to ensure that the site is suitable for the proper treatment and disposal of sewage.

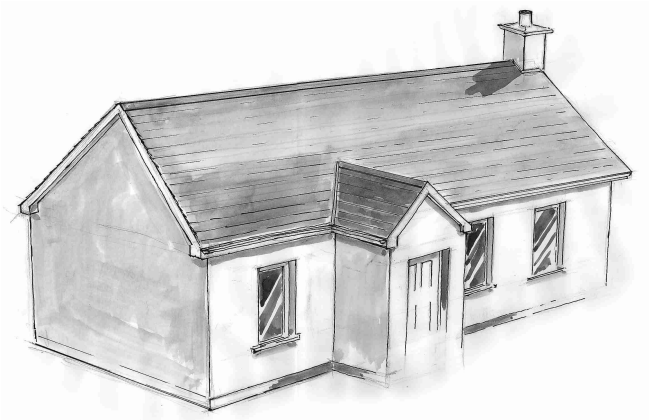
7. A dwelling house has a standard 300mm concrete block external wall with insulated cavity. Poor design detailing can result in the penetration of moisture to the inner leaf of the wall.

(a) Using notes and neat freehand sketches, show **three** locations where moisture may penetrate.

(b) For each location selected show, using notes and neat freehand sketches, the correct design detailing that would ensure that moisture does not reach the inner leaf.

(c) List **two** materials used to prevent the penetration of dampness in buildings. In the case of **each** material listed, state a location where it may be used and explain why the material is particularly suited for use in the location outlined.

8. The sketch shows a new dwelling house with a slated roof pitched at 45 degrees. The roof is a traditional cut roof and is designed to incorporate bedroom accommodation within the attic space.
The house has an internal width of 7.0 metres. The external walls supporting the flooring joists are standard 300mm concrete block walls with insulated cavity. The joists are also supported internally on a centrally located load bearing concrete block wall.



(a) To a scale of 1:20 draw a vertical section through the roof structure. Show the constructional details from the bottom of the wall plates to the top of the ridge board.
(It is not necessary to show slating or window details)

(b) To provide natural light to the bedrooms in the attic space, a choice must be made to fit either pitched dormer windows ***or*** roof light windows.

State **two** arguments in favour of fitting dormer windows and **two** arguments in favour of fitting roof light windows.

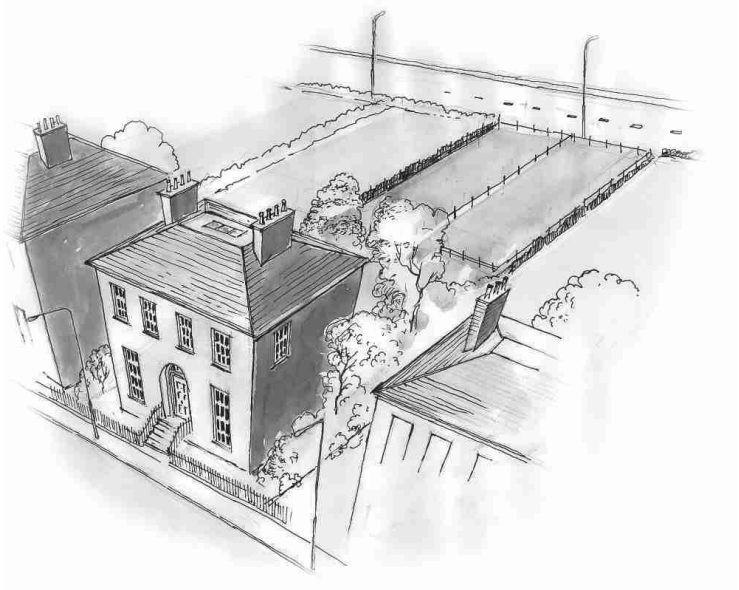
9. It is proposed to install a music system in the living room of a single storey dwelling house.
The house has a concrete floor and the living room is separated from an adjacent bedroom by a standard stud partition. The walls and ceilings have a smooth hardwall plaster finish. It is proposed to carry out renovations to improve sound insulation.

(a) Using neat freehand sketches show **two** design details that would increase the sound insulation properties of the stud partition.

(b) Explain in detail ***two*** sound insulation principles which would influence the design of the stud partition.

(c) Using notes and sketches suggest **two** modifications which would improve the acoustic properties of the living room.

10. A suburban dwelling house, built over one hundred years ago, has a large rear garden with mature trees and shrubs. A roadway provides access to the rear garden, as shown in the sketch.
Planning permission is being sought to divide the rear garden as shown and to erect two townhouses in the divided garden.



(a) What arguments might be presented:

(i) In support of the erection of the townhouses;
(ii) In support of the retention of the property in its original state?

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

OR

"The suburban spread of settlements is wasteful both in terms of its impact on existing fabric and infrastructure of towns, and in terms of the continual erosion of the landscape. If this trend is to be reversed, the built fabric of towns and villages will need to be renewed, and dwellings and related facilities provided which will attract families back to them"

Developing a Government Policy on Architecture (1996).

Discuss.

BLANK PAGE

BLANK PAGE

BLANK PAGE