



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF THE BUILT ENVIRONMENT

DEPARTMENT OF ARCHITECTURE

BUILDING CONSTRUCTION III

AAR 3108

Examination Paper

December 2014

This examination paper consists of 4 pages

Time Allowed: 4 hours

Total Marks: 100

Special Requirements: A1 DRAWING BOARDS, A1 PLAIN SHEETS, MASKING TAPE.

Examiner's Name: I. MHANDU.

INSTRUCTIONS

1. Answer ALL questions
2. Answer question 1 on an A1 sheet/s of paper
3. *Use pencil or technical pens only*
4. *Marks will be awarded for organised and neat drawings.*

MARK ALLOCATION

QUESTION	MARKS
1.	40
2.	20
3.	20
4.	20
TOTAL	100

QUESTION 1

A triple-glazed bay window projects 1.5 metres from the external wall of a dwelling house, as shown in Figure 1.

The external wall is a 350 mm concrete block wall with an insulated cavity. The lean-to roof is an insulated slated roof and has a pitch of 30°. Insulated plasterboard is fixed to the underside of the rafters to form a sloped ceiling.

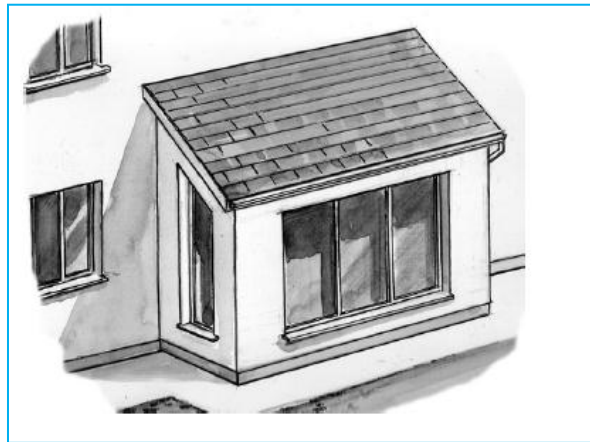


Figure 1: External wall of a house showing a 1.5 m projected triple glazed window.

(a)(i) Draw a vertical section using a scale of 1:5 through the window, roof and front wall of the house showing the typical construction details from 400 mm below the concrete lintels of the bay window, through the fixed frame of the window, wall plate and rafter to a level 400 mm above the abutment of the lean-to roof and the front wall of the house. (20)

(ii) Indicate on your drawing the design detailing that ensures moisture does not penetrate at the abutment of the roof and the wall of the house. (5)

(b) A concrete block chimney stack with a sand/cement render passes through a cut roof of the house above which is slated and is pitched at 45°.

(i) To a scale of 1:5, draw a vertical section through the chimney stack and roof, showing the typical details of the chimney stack, flue, chimney capping and portion of the roof structure. The design details should prevent the penetration of water between the chimney stack and the adjoining roof surface. (10)

(ii) On your drawing, show **two** design details that will help prevent the occurrence of a downdraught in a chimney. Include dimensions as appropriate. (5)

QUESTION 2

A development of new detached dwelling houses is proposed on the edge of a village.

In-situ concrete ground-supported floor slabs are proposed for the houses.

(a) Briefly describe how the contractor would reinforce the floor slab and explain why this reinforcement may be necessary. (5)

(b) Briefly describe how the contractor may undertake the following processes related to the construction of the *in-situ* concrete floor slabs and explain why each process is important to the quality of the finished concrete.

(i) compaction of the concrete (5)

(ii) finishing the slab surface (5)

(iii) curing the concrete (5)

QUESTION 3

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

(i) Scaffolding. (2)

(ii) Deep excavation. (2)

(iii) Outdoor use of electrical tools. (2)

- (b) Using *notes and freehand sketches*, outline two specific precautions that demonstrate best practice in order to eliminate each risk identified in (a) above. (14)

QUESTION 4

- a) (i) Identify the main five types of formwork systems currently in use? (5)
(ii) Which type of formwork would be the most appropriate for use in constructing tall concrete chimneys of industrial facilities with heights of 150 metres and explain its application? (5)
- b) Identify five benefits for using the type of formwork in 4(a)(i) (5)
- c) What causes formwork to fail in construction? (5)