

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF ARCHITECTURE AND QUANTITY SURVEYING

DEPARTMENT OF ARCHITECTURE
BACHELOR OF ARCHITECTURE (HONOURS) DEGREE

PART 1 SECOND SEMESTER EXAMINATIONS – MAY 2002
AAR 1204/AQS – INTRODUCTION TO MATERIALS AND CONSTRUCTION II

Instructions

Time: 2 hrs

The examination paper consists of six questions of which you must answer questions 1 & 2 plus any other two questions. All drawings to be freehand annotated sketches approximately to scale 1:50.

QUESTION 1

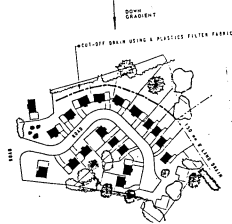
The purpose of a foundation is defined as that it should transmit the load of the building (structure) to the soil in such a way that the soil will not be over stressed, nor the structure be subjected to excessive movements that may occur in the soil.

- (a) What is meant by the bearing capacity of soil and explain briefly how it influences foundation design. ? (5)
- (b) When constructing on expansive soils it is normal to accept the soil movement due to change in volume of the soils. With the aid of sketch diagrams explain
 - (i) How a building can be isolated for the soil movements at the foundation? (10)
 - (ii) How a rigid foundation can withstand the soil movements. (10)

QUESTION 2

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On the site plan shown below a French drain method has been employed to reduce the amount of surface and under ground water to the area under construction.

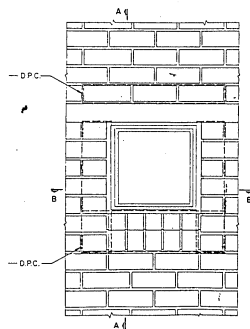


- (a) With the aid of a detailed cross section explain how this drain works and state the disadvantages of an open drain compared to the proposed drain. (10)
- (b) Adequate drainage of earth behind retaining wall will assist in minimising the lateral earth pressure. Explain with the aid of sketches how the earth behind a retaining wall can be drained. (10)
- (c) State in point form methods used in Zimbabwe for the water proofing of basements. (5)

QUESTION 3

Workmanship can do much to make a wall more resistant to water if it is associated with good materials. (10)

- (a) Explain briefly in point form the type of problems that can be encountered as a result of water penetration in masonry walls. (5)
- (b) Studies carried out on building contracts in several countries in Africa for over 20 years indicate that damp-proofing around window openings are common. Below is a diagram showing the elevation of a window opening.



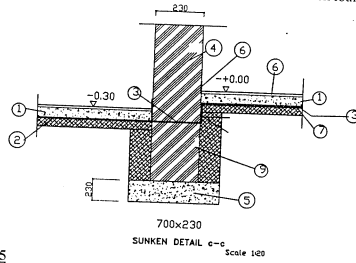
Produce Section A-A and Section B-B and explain briefly how each element controls water penetration through the window opening. (10)

- (c) What are the methods used to stabilise brick boundary walls (use diagrams to explain) (5)

QUESTION 4

A lintel is a beam across the top of an aperture.

- (a) Explain briefly the three types of lintel construction commonly used in Zimbabwe. (10)
- (b) With the aid of sketch diagrams, illustrate how ground water is prevented from penetrating walls and floors. (10)
- (d) Label the elements marked 1 to 10 in the details of a sunken lounge shown below. (5)



QUESTION 5

The diagram below shows a detailed section through a parapet wall and flat concrete roof.

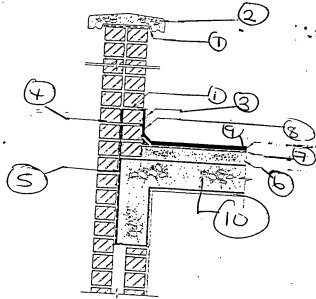
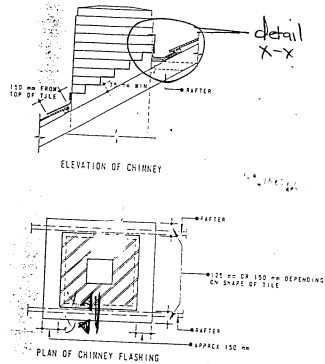


FIGURE 14
Parapet construction over cavity wall for mastic asphalt roofing

- (a) Label elements marked 1 to 10. What type of materials are used to make elements 1, 3, 4 and 7 and what purpose do the elements serve on this design? (10)

- (b) The diagram shows the Elevation and Plan of a Chimney Flashing. Design and sketch marked details X and Y. (10)



- (c) The correct choice of materials for gutter and flashing depends on the corrosion risk. What type of materials should be used in areas of;
- Severe corrosion risk and why?
 - Where metal flashing or gutters rest on boards (e.g. valley boards) (5)

QUESTION 6

- Illustrate with the aid of diagrams the difference between a solid floor slab and a suspended floor slab. (10)
- What are the main functions of a floor in a building? (5)
- In plastering, the nature of the background materials to which the rendering is applied is important and influences the choice of finish to be used, number of coats, etc. Explain briefly how the following grounds are prepared for rendering – (10)
 - Dense, strong and smooth materials
 - Moderately strong and porous materials
 - Moderately weak and porous materials

THE END