

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

DEPARTMENT OF ARCHITECTURE
BACHELOR OF ARCHITECTURE (HONOURS) DEGREE

PART II SUPPLEMENTARY EXAMINATIONS – JULY 2003
AAR 2104 Environmental Design I

Instructions

Answer Question 1 and four (4) other questions only.

Time: 3 hours

1. Among other things, a building is to be seen as a bio-climatic filter protecting the occupants from the vagaries of the outdoor climate. Traditional buildings of less sophisticated societies in various climatic regions attest to the truth of the concept of “building with climate”.

Describe the traditional building types given by Antony Sealey related to the climatic types according to Koppen’s classification, and give suggestions as to how modern architecture can learn from these traditional buildings. Make specific reference to Zimbabwe.

(20 marks)
2. Glass has become an important material in modern building, but its unique property of differential transparency to radiation requires that it be used with caution.
 - (a) Describe this particular property of glass, and explain its significance for thermal control in buildings.

(5 marks)
 - (b) Evaluate the various types of glass/glass treatments used to limit heat penetration into buildings.

(15 marks)
3. Among the environmental design strategies used for thermal control in buildings, Siting, Building Orientation, and Building Morphology could significantly reduce the impact of solar heating on buildings. Discuss the application of these strategies in environmental design, making specific reference to the Zimbabwean context.

(20 marks)
4. The control of solar penetration through windows is an important aspect of building design. Among the general techniques used for solar control is the use of external sun-shading devices. Describe the three (3) basic types of external sun-shading devices, giving the advantages and disadvantages of each, making reference to examples in Bulawayo. Sketches are necessary.

(20 marks)
5. The impact of solar radiation on the indoor thermal environment of buildings can be studied under two thermal conditions: STEADY STATE and PERIODICALLY FLUCTUATING. Discuss these thermal conditions in detail, explaining how each is used in the study of the impact of solar radiation on the indoor thermal environment.

(20 marks)
6. (a) Briefly explain the following terms used in lighting studies:
 - (i) Daylight Factor; (ii) CIE Sky; (iii) Colour Temperature; (iv) Gaseous Discharge Lamps.

(8 marks)

(b) Apart from quantity of light, the quality of light in a building is also important. Discuss the requirements of good lighting in buildings, particularly in tropical conditions.

(12 marks)

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(a) Explain one (1) of the following, as used in architectural acoustics:
(i) Acoustical Defects; (ii) Reverberation Time; (iii) Sound Absorbers.

(5 marks)

(b) Discuss the five (5) basic rules for sound level reduction in buildings.

(15 marks)

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