

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

DEPARTMENT OF ARCHITECTURE
BACHELOR OF ARCHITECTURE (HONOURS) DEGREE

PART II – FIRST SEMESTER EXAMINATIONS – DECEMBER 2005
AAR2104 – ENVIRONMENTAL DESIGN I

Instructions

Time: 3 hours

Answer question 1 and three other questions only

Q1

- a) What are the principal characteristics of the three tropical climatic zones that you have learnt? (15)
- b) Of the above climates which one poses more problems to the architect and how does he attempt to solve them. (10)

Q2

- a) What is meant by orientation of a building and how can it influence the thermal environment. (15)
- b) Describe the characteristics of an urban area that are instrumental in causing deviation from the localized climate.

Q3

- a) What are the factors that influence thermal comfort? (10)
- b) Describe four methods that were used in search for a comfort scale, and indicate the most reliable one. Also indicate, limitations, equipment/materials used. (15)

Q4 Describe five types of energy conserving principles and environmental design strategies that you have learnt and indicate those that apply to the warm Humid equatorial climate.

Q5 The choice of building materials, especially for the external building envelope, greatly affects the flow of heat into the buildings. This is so because materials vary in their properties that determine heat flow. As such, building materials have to be chosen for the particular climatic environment.

- a) List the thermophysical properties of building materials that are important to their thermal performance in buildings (5)
- b) Account for the significance of climate in relation to the correct use of building materials. (15)

Q6

What are the principal functions of ventilation? In what ways can an architect assume sufficient ventilation to all parts of a building and at the same time keep out rain, dust and excessive heat. (25)

Q7 Write short notes on the following

- I) shading devices (make sketches) (15)
- ii) Factors that affect thermal comfort in indoor environment:
- iii) Earth – sun relationship. (5)
- iv) Macro and micro – climate (5)
- v) Bio – climatic chart (5)

Q8

a) Explain the following terms used in sound insulation and acoustics.

- (i) decibel scale
- (ii) the reverberation time
- (iii) Sound absorption coefficient
- (iv) Sabine equation
- (v) Acoustical defects

b) Give the various methods used to control external and internal noise. (10)

Q9 Write short notes on the following and include sketches

- i) shading devices
- ii) factors that affect thermal comfort
- iii) Earth – Sun relationship
- iv) Micro climate site climate
- v) Bio - climate chart
- vi) Limitation of comfort scales that are used in search of a comfort scale.
- vii) PSALI & PAL
- viii) CIE sky