



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF THE BUILT ENVIRONMENT

DEPARTMENT OF ARCHITECTURE

ENVIRONMENTAL DESIGN I

AAR 2104

Examination Paper

December 2017

This examination paper consists of 4 pages

Time Allowed: 3 hours

Total Marks: 100

Examiner's Name: B. Ncube

INSTRUCTIONS

1. Answer any four questions

MARK ALLOCATION

| QUESTION | MARKS |
|-----------------|--------------|
| 1. | 25 |
| 2. | 25 |
| 3. | 25 |
| 4. | 25 |
| 5. | 25 |
| TOTAL | 100 |

QUESTION 1

- a. Thermal comfort depends on the four climatic variables, however influenced by a number of individual factors, explain these. (10)
- b. Naturally ventilated buildings require a hybrid of measures, describe design strategies an architect could use, illustrating with sketches where appropriate. (15)

QUESTION 2

- a) Daylight factor is the internally available daylight, expressed as a proportion of the daylight available externally at the same time. List the factors that affect day lighting within a building. (5)
- b) Good day-lighting standards reduce the need for electrical lighting. Discuss practical design strategies by which day-lighting may be achieved to obtain a minimum daylight factor of 1.5-2% of a habitable room in housing. (10)
- c) An Architect needs to take into account sense of privacy and security. Discuss how this can be achieved in a housing unit bearing in mind use behavior and site constraints. (10)

QUESTION 3

- a. Distinguish between acoustic treatment and sound insulation. (5)
- b. Using the following sound control techniques; “Absorption, Reflection and Diffusion” explain how finishes can be used to affect room acoustics of a library. (10)
- c. Using sketches of a horse-shoe or a fan shaped design of an auditorium without the use of sound reinforcement system, describe the sound path from source to receivers. (10)

QUESTION 4

- a. List the three determinants of a space. (5)
- b. Explain the elements of design for outdoor environments and describe their impact unto the built environment. Make use of the following case study in fig. 1. (20)



Figure 1

QUESTION 5

- a. Solar shading design should allow heat gain during the colder months while reducing summer heat gain to prevent overheating. Name and explain how these elements are used in buildings, use sketches where appropriate. (10)
- b. Outline and describe building materials to be used in the erection of buildings within the following climatic conditions.
- I. Hot, dry climate
 - II. Warm humid climates
 - III. Cold snowfall climates (15)