

**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
FACULTY OF THE BUILT ENVIRONMENT

**DEPARTMENT OF ARCHITECTURE**  
BACHELOR OF ARCHITECTURE (HONOURS) DEGREE  
2013-2014 ACADEMIC YEAR

PART II – FIRST SEMESTER SUPPLEMENTARY EXAMINATIONS – JULY 2014

**AAR 2104 – ENVIRONMENTAL DESIGN I**

**Instructions**

***Time: 3 hours***

*Answer all questions.*

Use illustrations where appropriate

**QUESTION 1**

- a. Describe passive and active systems that can be used in thermal control of buildings in the Tropics. (15)
  - b. Explain the principal functions of ventilation in buildings? (5)
- [20]**

**QUESTION 2**

A design studio measures 12 x 6.7 x 2.9 m in height. It's walled with wallpaper on the shorter ends and glazed full height on the longer sides. It has 25 occupants.

- a. Calculate the reverberation times at the frequencies given using the data provided in table 1.0 (10)
  - b. Explain the values obtained in (a) in relation to the frequencies (10)
- [20]**

**QUESTION 3**

- a. What are the principal benefits of day lighting in buildings? (5)
  - b. Explain the design of shading devices and their effect considering the different positions of the sun. (15)
- [20]**

**QUESTION 4**

- a. Highlight what can be the sources of airborne and structure borne noise in buildings. (10)
  - b. Give the various methods used to control external and internal noise. (10)
- [20]**

**QUESTION 5**

Discuss the significance of climate in relation to the correct use of building materials. **[20]**

<b>Material</b>	<b>Quantity</b>	<b>Area/Unit (m<sup>2</sup>)</b>	<b><math>\alpha_s</math> at 125Hz</b>	<b><math>\alpha_s</math> at 4KHz</b>
Drawing boards	25	1.02	0.19	0.3
Stools/seats	25	0.12	0.15	0.3
Whiteboard	1	2.07	1.69	1.42
Ceiling panels			0.05	0.32
Luminaries	15	0.25	0.38	0.87
Ceramic tiles floor			0.01	0.02
Wallpaper on brick wall			0.02	0.08
Glazing			0.35	0.04
People		25	0.25	0.5

**Table 1.0-Absorption Coefficients**