

**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**

FACULTY OF THE BUILT ENVIRONMENT

**DEPARTMENT OF ARCHITECTURE**

BACHELOR OF ARCHITECTURAL STUDIES (HONOURS) DEGREE

**2012-2013 ACADEMIC YEAR**

PART 111 – FIRST SEMESTER EXAMINATIONS – JANUARY 2013

**AAR 3103 BUILDING SERVICES I**

Instructions

Time: 3 Hours

- All questions carry equal marks
- Answer any four questions

**Question 1**

- a) Discuss problems associated with hot water systems and how they can be harnessed. (20)
- b) Considering the water woes that Bulawayo community has experienced what ideas can you share with BCC in line with water economy? (5)

[25]

**Question 2**

- a) “Strategic positioning of lifts in a building is a critical factor to be considered in the early design stages of the building.” Discuss the statement in line with good lift design principles. (12)
- b) A group of 5 lift cars, each having a carrying capacity of 15 persons and a car speed of 2m/s is specified for a 16 storey office block with a floor pitch of 3m. The net floor area above the ground floor is 7000m<sup>2</sup>. The population density is 1 person per 10m<sup>2</sup> of the net floor area and the starting time is unified. The clear door width is 1.2m and the door opens at a speed of 0.4m/s. Compute the handling capacity and determine the quality of service for this installation. (13)

[25]

**Question 3**

- a) Discuss factors that you would need to consider when selecting the most appropriate fire fighting installation in any building under concern. (12)
- b) The NUST administration building has an automatic sprinkler system that serves as a first aid measure whilst waiting for the fire brigade team, if any part of the building catches fire. Debate the suitability of the system in this building. (13)

[25]

**Question 4**

- a) Write brief notes on the provision of emergency power using any four sources you know. (20)
- b) Advise your client, NUST, on the most appropriate emergency power source for the institution, justifying your choice. (5)

[25]

**Question 5**

- a) A production area in a factory measuring 80 m x 30 m x 8m has a white ceiling and dark coloured walls with reflection factors of 70% and 30% respectively. Fluorescent lamps are to be used, with each lamp having a Lighting Design Lumen (LDL) output of 17,500 lumens, the illumination required for the factory area being 250 lux and the lamp maintenance factor of 0.75. The working tables are 0.73m high.

Making use of table 1:

- i. Compute the Room Index (RM), and (3)
- ii. Design the lighting system for this factory. (16)

Table 1 Utilisation Factors

Ceiling	Reflectance %								
	70			50			30		
Walls	50	30	10	50	30	10	50	30	10
Room Index									
0.62	0.24	0.24	0.19	0.27	0.22	0.19	0.24	0.21	0.19
1.25	0.49	0.42	0.38	0.45	0.40	0.36	0.39	0.36	0.33
1.92	0.56	0.48	0.42	0.49	0.43	0.39	0.40	0.40	0.36
2.50	0.64	0.57	0.55	0.57	0.53	0.49	0.48	0.48	0.43
3.00	0.68	0.64	0.60	0.63	0.59	0.56	0.55	0.52	0.48

- b) Glare is a condition of vision in which there is discomfort, or a reduction in the ability to see significant objects, due to an unsuitable distribution or range of luminance. What measures would you consider at designing stage either to avoid or reduce glare inside a building? (6)

[25]