NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF BUILT ENVIRONMENT

DEPARTMENT OF ARCHITECTURE

BUILDING SERVICES I

AAR 3103

Examination Paper

December 2014

This examination paper consists of 3 pages

Time Allowed: 3 hours

Total Marks: 100

Examiner's Name: R. Muvungani

INSTRUCTIONS

1. Answer any four (4) questions
2. Each question carries 25 marks
3. Use of calculators is permissible

MARK ALLOCATION

QUESTION	MARKS
1.	**25**
2.	**25**
3.	**25**
4.	**25**
5.	**25**
TOTAL	**100**

QUESTION ONE

a) Explain the terms 'temporary' and 'permanent' hardness of water and list the characteristics of that water. [5]

b) Describe, with the aid of illustrations, a suitable cold water services installation for a twenty storey hotel building where the mains pressure is only sufficient to reach the fifth floor. [20]

QUESTION TWO

a) Explain how the spread of fire is expected to be limited by good building and services practice. [10]

b) Describe the fire fighting provisions (both fixed and portable) that can best be fitted in a large industrial oil-fired boiler plant. [15]

QUESTION THREE

a) A drawing office 16m x10m x4m has a white ceiling and white coloured walls. The working plane is 0.80m above the floor. Double-lamp luminaires emitting 5100 lumen are to be used and the illuminance required is 600lm/m2. A high standard of maintenance will be assumed, giving a maintenance factor of 0.9. Given that luminance factors are 70% for the ceiling and 50% for the walls, calculate the number of luminaires needed, making use of Table 1, and draw their layout arrangement. [20]

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

b) Discuss how the use of air-handling luminaires improves the performance of lighting installations and make better use of energy. [5]

QUESTION FOUR

a) Explain with the aid of illustrations how hydraulic lifts operate and where they are best installed. [20]

b) Describe lift traffic analysis and discuss the essentials of carrying out such an analysis. [5]

QUESTION FIVE

a) There are basically two systems of providing hot water to buildings. Evaluate the most suitable system you would have recommended for the NUST hostels. [15]

b) Advise on the most suitable central hot water system to install in an area that has problems of hard water. [10]

