NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF BUILT ENVIRONMENT

DEPARTMENT OF ARCHITECTURE

BUILDING SERVICES I

AAR 3103

Examination Paper

December 2017

This examination paper consists of 3 pages

Time Allowed: 3 hours

Total Marks: 100

Examiner's Name: R. Muvungani

INSTRUCTIONS

1. Answer any 4 questions
2. Use of calculators is permissible

MARK ALLOCATION

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

QUESTION ONE

a. A proposed building that is to have 25 storeys. It is still undergoing a feasibility study and it has been discovered that the water mains pressure will not be adequate to supply upper floors. As part of the team carrying out the study, advise with the aid of clear sketches, on how the cold water can be supplied to such a building. (15)
b. Outline key issues that are considered during the commissioning stage of this water supply system (10)

QUESTION TWO

Compare and contrast firefighting using a sprinkler system to that of a mulsifyre system

QUESTION THREE

a. Differentiate a series from a parallel electricity circuit (6)
b. Explain benefits associated with a three phase supply over a single phase supply in buildings (8)
c. Explain the following terms to do with light designing in buildings:
   i. Maintenance factor (2)
   ii. Utilization factor (2)
   iii. Luminous intensity (2)
   iv. Light loss factor (2)
   v. Daylight factor (3)

QUESTION FOUR

a) A lift car starts from rest and is accelerated uniformly at a rate of 0.5m/s for 5 seconds. It then maintained a constant velocity for 12 seconds, and then uniformly retarded at a rate of 0.5m/s. If the lift traveled non-stop from ground floor to the middle floor, calculate the lift travel of the building (10)
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 distance of 3m between floors. The net floor area above the ground floor is 7000m^2. The population density is 1 person per 10m^2 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 quality of service for this installation. (15)

QUESTION FIVE

a. Discuss the use of solar as a source of energy for both heating and lighting. (10)

b. Estimate the hot water storage requirements for a small hospital, during a 1-hour peak demand period, having the following sanitary appliances:

25 wash basins, 15 baths, 15 showers, 10 wash up sinks. Use table 1.1 for your calculations

Table 1.1 Capacity of hot water usage at each appliance

Appliance	**Capacity (Ltrs)**	**Peak demand usage frequency**
Wash basin:		2
Hand wash	1,5	
Hair wash	6	
Shower	13	3
Bath	70	2
Wash machine	70	
Sink:		
Wash up	15	3
Cleaning	5	

(15)

