



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF THE BUILT ENVIRONMENT

DEPARTMENT OF ARCHITECTURE

BAR 3112

DEPARTMENT OF QUANTITY SURVEYING/ CONSTRUCTION MANAGEMENT

BCM 2102

BUILDING SERVICES & SYSTEMS I

Examination Paper

December 2024

This examination paper consists of 3 pages

Time Allowed : 3 hours

Total Marks : 100

Examiner's Name: H. Wilson

INSTRUCTIONS

1. Answer question 1 and any other 2 questions
2. Use of calculators is permissible

MARK ALLOCATION

QUESTION	MARKS
1.	50
2.	25
3.	25
4.	25
5.	25
TOTAL	100

QUESTION 1 (COMPULSORY)

- a) Explain the terms 'temporary' and 'permanent' hardness of water and list the characteristics of that water. [5]
- b) Analyze a historical building fire and discuss how a firefighting system could have prevented or mitigated the damage. [10]
- c) How do building services and systems impact the overall building design and functionality[10]
- d) Describe any 3 containing systems used in buildings [9]
- e) Describe how the following lighting design objectives impact lighting designs in buildings.
 - i. Safety [2]
 - ii. Appearance [2]
 - iii. Performance [2]
 - iv. Comfort [2]
 - v. Health [2]
- f) What factors should be considered when recommending the desired illumination in a room? [6]

QUESTION 2

- a) List any 5 factors which determine the type of hot water system to be used in a 5 star hotel. [5]
- b) With the aid of sketches, illustrate the difference between a direct and indirect cold water supply system in a building. [6]
- c) What factors does one have to consider when buying the most appropriate generator for use as an emergency electricity supply source for a Broadcasting station.[5]
- d) With the aid of sketches, illustrate the types of drainage systems used in the following:
 - i. flat roof [3]
 - ii. gable roof [3]
 - iii. parapet roof [3]

QUESTION 3

A proposed building is to have 5storeys. 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, advisewith the aid of clear sketches, on how the cold water can be supplied to such a building. [25]

QUESTION 4

- a. List the 3 categories of lifts. [3]
- b. Outline at least 7 factors to consider when planning lifts inside a multi-story structure. [7]

A group of 3 lift cars, each having a carrying capacity of 8 persons and a car speed of 2m/s is specified for a 10storey office block with a floor pitch of 3m. The net floor area above the ground floor is 5000m². The population density is 1 person per 10m² 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. [15]

QUESTION 5

- a. With the aid of clearly labelled sketches describe any 4 vertical transportation systems used in buildings [16]
- b. From the above, pick any 3 vertical transportation systems and describe the safety features of each. [9]