MEBS6000 Utility Services

http://ibse.hk/MEBS6000/

Assignment 01 – Water Supply Systems, Drainage and Sewage Disposal (2022-2023)

1. Cold and Hot Water Supply Systems

1.1 Explain the typical process of planning and designing utility connections in urban cities. Comment on the pros and cons of using urban utility tunnels.

(10 marks)

1.2 Describe the typical water treatment process in Hong Kong. Briefly discuss the key factors which affect the drinking water quality in buildings.

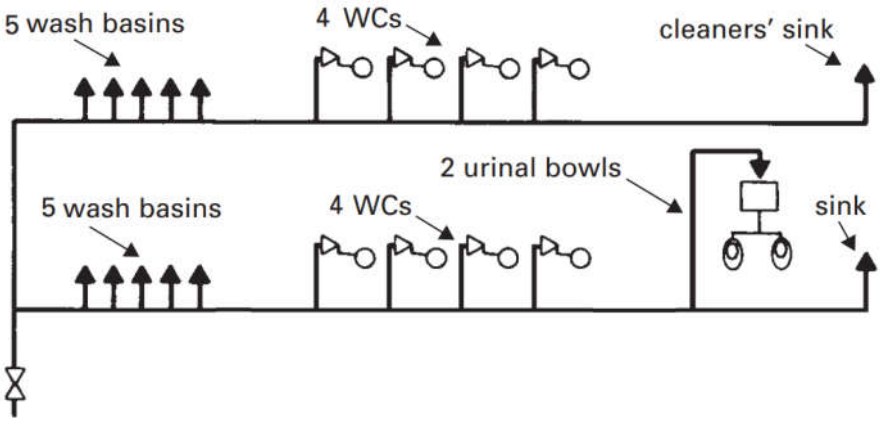
(10 marks)

1.3 Briefly describe the five categories of water resources in Hong Kong. Discuss the important areas of Total Water Management (TWM) strategy in our society and the implications to plumbing engineering design.

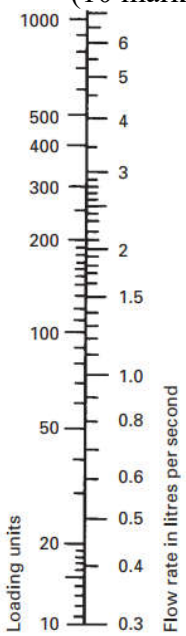
(10 marks)

1.4 A water supply piping system is shown on the following figure. Determine the total loading units and required flow rate for the system. Assume each of the two urinals has a continuous flow of 0.004 litre/s, calculate the design flow rate of the whole system. Explain the principle and key factors of simultaneous demand used for the water supply piping system.

(10 marks)



Type of appliance	Loading unit
WC flushing cistern	2
Wash basin 1⁄2 – DN 15	1.5 to 3
Bath tap 1 – DN 25	22
Sink tap 1⁄2 – DN 15	3



1.5 Solar hot water system is an environmentally friendly renewable energy system. Explain the principles of direct type and indirect type solar water heating systems. Illustrate with schematic diagrams. Describe the benefits of the indirect type system.

(10 marks)

1.6 Briefly explain the design requirements in Hong Kong for centralised hot water systems. Discuss the major considerations when designing hot water systems for high-rise buildings.

(10 marks)

2. Sanitation and Drainage

2.1 A vertical drainage stack pipe of diameter 125 mm has a water discharge from a branch pipe with a flow rate of 2 litre/s. Calculate the terminal velocity of the downward discharge flow and the terminal length below point of discharge entry. If another two branch pipes at the lower floors also discharge water simultaneously, draw a sketch diagram to show the variation of air static pressure in the drainage stack. Discuss the pressure effects and risk of seal losses due to water flow in the drainage stack.

(10 marks)

2.2 The sanitary drainage system could be a risk for the spread of COVID-19 and SARS disease in high-rise residential buildings. Briefly explain the possible disease transmission paths and discuss the possible methods to prevent this.

(10 marks)

3. Sewage Disposal

3.1 If connection to public sewers is not feasible for a building project, briefly describe the sewage disposal methods which can be considered.

(10 marks)

3.2 Explain the three common acceptance tests of drainage systems. Illustrate with diagram(s). Discuss the safety precautions for doing testing and maintenance in underground manholes.

(10 marks)