

## Assignment 01 – Water Supply Systems, Drainage and Sewage Disposal (2023-2024)

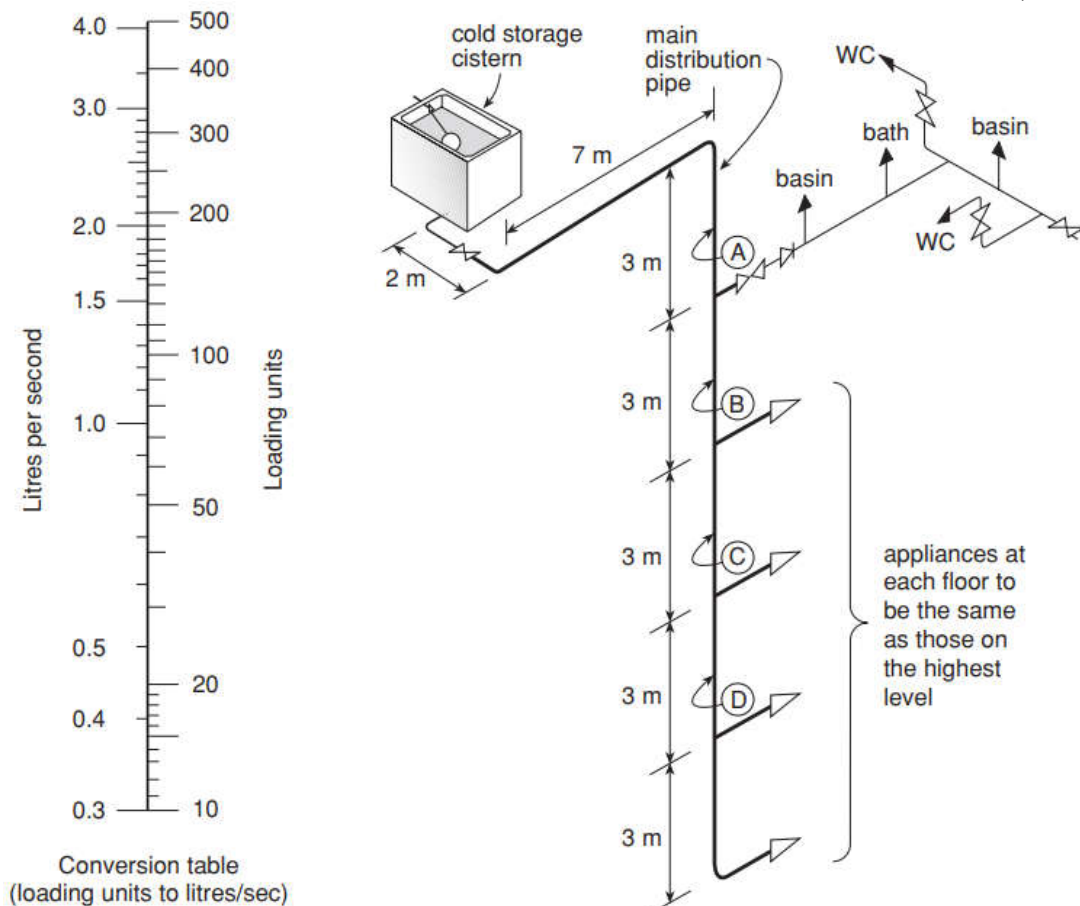
### 1. Cold and Hot Water Supply Systems

1.1 Explain the typical process of planning and designing utility connections in urban cities. Discuss the important factors affecting the design and operation of building and utility services systems.

(10 marks)

1.2 A cold water supply system is shown on the following figure. Determine the loading units and flow rate for the pipe sections A, B, C and D. Explain the principle and key factors of simultaneous demand used for the water supply piping system.

(10 marks)



Sanitary appliance	Loading unit
WC cistern	2
Bath	10
Wash basin	1.5

- 1.3 Explain the typical water treatment process in Hong Kong. Discuss the key factors to be considered to ensure good water quality from the taps in the buildings. (10 marks)
- 1.4 The Total Water Management (TWM) strategy in Hong Kong has mapped out the strategy for sustainable use of water to ensure water security and support the development of the society. Describe the major areas of the TWM strategy and discuss its implications to plumbing engineering design. (10 marks)
- 1.5 Explain the working principle and key components of a heat pump water heater. Illustrate with diagram(s). Briefly describe the technical requirements for non-centralised hot water systems applied in Hong Kong. (10 marks)
- 1.6 Briefly describe the pros and cons of using the following pipe materials in water supply systems: (a) copper, (b) stainless steel and (c) lined galvanised steel. Which one is not suitable for hot water system? Explain why. (10 marks)

## 2. Sanitation and Drainage

- 2.1 A vertical drainage stack pipe of diameter 100 mm has a water discharge from a branch pipe with a flow rate of 1.5 litre/s. Calculate the terminal velocity of the downward discharge flow and the terminal length below point of discharge entry. Discuss how the air pressure fluctuations in the drainage stack may affect the loss of water seal and the escape of the foul air. Illustrate with diagrams. (10 marks)
- 2.2 Explain the possible reasons for the loss of water seal in building drainage systems. Discuss how the sanitary drainage system could be a risk for the spread of COVID-19 and SARS disease in high-rise buildings. (10 marks)

## 3. Sewage Disposal

- 3.1 Explain the three common acceptance tests of drainage systems. Illustrate with diagram(s). Discuss the major design considerations and different methods for sewage pumping. (10 marks)
- 3.2 Briefly describe the different types of sewage treatment facilities in Hong Kong. Draw a diagram to show the basic concept of grey water recycling and rainwater harvesting system. Give two examples of the potential end use of the reclaimed water. (10 marks)