- Product inlet temperature = $35 \,^{\circ}C$

- Steam temperature = $100 \,^{\circ}\text{C}$

- Product outlet temperature = $95 \,^{\circ}C$

× ×

2. Fuel Gas Supply

water system.

2.1 Briefly describe the four types of gas water heaters for domestic bathroom application. Discuss the issue of accidental carbon monoxide poisoning and suggest a suitable type of gas water heater to avoid such an accident.

(10 marks)

(8 marks)

2.2 A commercial kitchen appliance running on town gas (with a calorific value of 17.27 MJ.m⁻³) has a heat output of 20 kW and an efficiency of 70%. Calculate the flow rate of towngas required for the appliance. Given the following data and information, calculate the pressure loss of the town gas pipe.

-	Gas flow rate = $8 \text{ m}^3.\text{hr}^{-1}$	The Pole formula:	
-	Pipe diameter = 15 mm Specific gravity of town gas = 0.52 Length of the pipe = 4.2 m	$Q = 0.0071 \sqrt{\frac{h \times d^5}{s \times l}}$	(m^3/hr)
			(7 marks)

3. Vertical Transportation

3.1 Explain the design requirements and considerations for fireman's lift. Describe how the fireman's service mode of a fireman's lift can be activated.

(6 marks)

IBTM6010H Utility Services

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Assignment 02 – Steam Systems, Fuel Gas Supply, Vertical Transportation, Telecommunication and Extra Low Voltage Systems (2021-2022)

1. Steam Systems

1.2

1.1 Discuss the importance of condensate recovery in steam systems. Explain the operating principles of different types of steam traps. Illustrate with diagrams.

For an indirect steam heating system, calculate the log mean temperature difference

(LMTD) and the arithmetic mean temperature difference (AMTD) of the heat transfer process based on the following information. Discuss the benefits of using steam over hot

(9 marks)

3.2 Discuss the precautions needed for escalator planning and design to prevent the spread of fire and smoke in atrium and multi-story buildings. Illustrate with diagram(s).

(7 marks)

3.3 A lift system comprising four cars of rated speed 1.6 m.s⁻¹ and rated car capacity of 10 persons have door opening times of 3.0 seconds and door closing times of 4.0 seconds. The flight time between adjacent floors of interfloor distance 3.5 m is 4.5 seconds. Assuming passengers can enter/exit at 1.2 seconds (average time), calculate the round trip time (RTT). Assume that the highest floor reached is 10 and the number of stops is 9. If the lift speed is increased to 2.5 m.s⁻¹, what is the effect on the RTT?

(10 marks)

3.4 The design engineer of a mass transit railway company is asked to check the proposed transportation system for a new terminal subway station as described below.



For the following two operation modes of the escalators, perform evaluation and suitable calculations to determine if the platform will be clear by the time the next train arrives and the likely condition of passengers queuing. Comment on the ideal strategy for operating and maintaining the escalators.

- (a) Normal mode: 2 no. up, 2 no. down (for both sets of escalators)
- (b) Tidal flow mode: 3 no. up, 1 no. down (for both sets of escalators)

(10 marks)

4. Telecommunication Services

4.1 Describe the steps to design a structured cabling system (SCS) for an office building. What are the main advantages of using SCS?

(10 marks)

4.2 Compare the system design options for in-building wireless systems. Discuss the pros and cons of the design options.

(7 marks)

5. Extra Low Voltage Systems

5.1 Briefly describe the three types of extra low voltage (ELV) sources and illustrate with diagrams. Explain the principles of using ELV design to ensure safety of the electric circuit.

(8 marks)

5.2 Explain the meanings of monitored and unmonitored systems for the design of security systems. Discuss the common causes of false alarms.

(8 marks)