

Cork Institute of Technology
Bachelor of Science in Construction Economics – Award
Bachelor of Science in Construction Management – Award

(CCECO_7_Y3) (CCMNG_7_Y3)(CCMNE_7_Y3)

Autumn 2008

Building Services & Equipment

(Time: 3 Hours)

Instructions
Answer FIVE questions
All questions carry equal marks.

Examiners: Ms. M. Cullinane
Mr. J. O'Rourke
Mr. J. Hanahoe
Mr. S. Brady
Mr. P. Quinn

Q1 Fire Safety

- (a) Describe, with the aid of diagrams, the following;
- (i) automatic fire ventilation
 - (ii) pressurisation of escape routes (6 marks)
- (b) Sketch and describe the operation of one type of fire extinguisher. (4 marks)
- (c) Explain wet and dry risers (rising mains) (4 marks)
- (d) Identify 3 classes of fire extinguisher.
For each class, include in your answer;
- (i) the flammable agent
 - (ii) the extinguishing agent (6 marks)

Q2 Fire Regulations & Service Ducts

- (a) The Fire Safety building regulations sets out provisions in sections B1 to B5. Describe these 5 sections. (10 marks)
- (b) Sketch and describe 3 different types of ducts for engineering services (6 marks)
- (c) What fire precautions should be employed in service ducts? (4 marks)

Q3 Heat Exchangers

- (a) Sketch *three* types of flow arrangement according to which heat exchangers are classified (6 marks)
- (b) Exhaust gases flowing through a tubular heat exchanger at the rate of 0.7 kg/s are cooled from 350 to 100°C by water initially at 20°C. The specific heat capacities of exhaust gases and water may be taken as 1.13 and 4.19 kJ / kg K respectively, and the overall heat transfer coefficient from gas to water is 200 W / m² K. Calculate the surface area required when the cooling water flow is 0.2 kg/s, for both parallel and counter flow. (14 marks)

Q4 Electricity

- (a) Explain, with the aid of a diagram, a zoning arrangement of a low voltage 3-phase supply within a building (4 marks)
- (b) Sketch a 3-phase 5-wire armoured cable (4 marks)
- (c) A high voltage supply will incur significantly higher capital and operating costs for the consumer than a low voltage supply. Explain why (4 marks)
- (d) What is a substation and identify 2 types of substation used in a high voltage network (4 marks)
- (e) Sketch two types of floor duct layout for power and data distribution in an office (4 marks)

Q5 Air Conditioning

- (a) Write a brief note on *two* of the following;
- (i) constant volume
 - (ii) fan coils
 - (iii) chilled beams
 - (iv) air diffusers
- (6 marks)
- (b) Sketch and describe the four stages of the compression refrigeration cycle (6 marks)
- (c) Describe the purpose and operation of a cooling tower (4 marks)
- (d) Define the term *cleanroom* (2 marks)
- (e) Identify two industrial applications which would require a cleanroom (2 marks)

Q6 Heating Systems

- (a) Compare and contrast various heat distribution media (8 marks)
- (b) Sketch and describe the operation of *two* types of heat emitters (4 marks)
- (c) Sketch and describe the operation of a steam heating system (4 marks)
- (d) Discuss Combined Heat & Power and District Heating (4 marks)

Q7 Drainage

- (a) Describe the 3 sections (H1 to H3) set out in the Building Regulations Technical Guidance Document H *Drainage & Waste Water Disposal* and sketch a drainage system that is in accordance with the regulations (8 marks)
- (b) Describe the processes involved in a large-scale sewage treatment scheme (6 marks)
- (c) The cross-section of a rectangular channel is shown in Figure 1. Calculate the flowrate in litre/sec when the drain is laid at a gradient of 1 in 250. (6 marks)

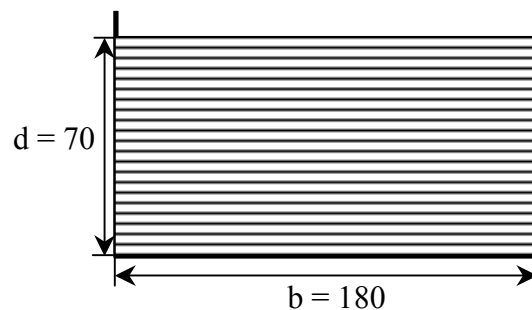


Figure 1: Question 7 (c)