

UNIVERSITY OF BOLTON

OFF CAMPUS DIVISION

WESTERN INTERNATIONAL COLLEGE

BENG (HONS) CIVIL ENGINEERING

SEMESTER ONE EXAMINATION 2023/24

SUSTAINABLE CONSTRUCTION AND MATERIALS 1

MODULE NO: CIE4019

Date: Tuesday 09 January 2024

Time: 10:00 AM – 11:30 AM

INSTRUCTIONS TO CANDIDATES:

There are FIVE questions on this paper.

Answer any FOUR questions.

Marks for parts of questions are shown in the brackets.

This examination paper carries a total of 100 marks.

All working must be shown. A numerical solution to a question obtained by programming an electronic calculator will not be accepted.

Attach pages 2 & 4 with the answer script.

Question 1

a) How do construction professionals typically categorise foundations, and what are the different classifications of shallow foundations and deep foundations?

(16 marks)

b) Identify the different types of foundations from **Figure 1**.

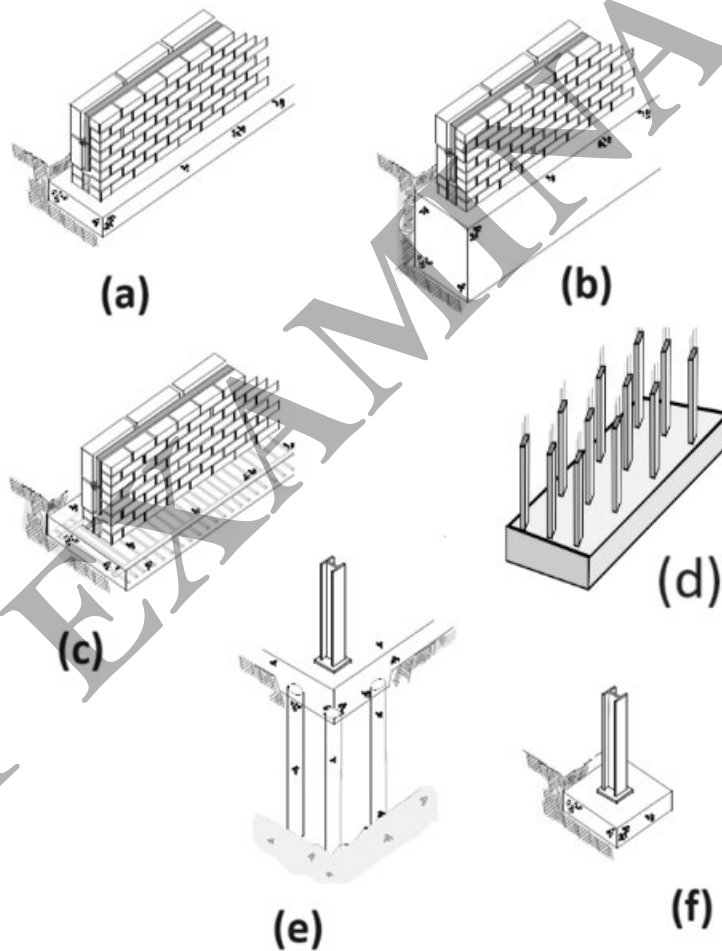


Figure 1

(9 marks)

Total 25 marks

Please turn the Page

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Question 2

a) What are the different components of a solid floor? Explain the purpose of each layer in this system listing the various materials which can be used.

(16 marks)

b) Draw and annotate the view at the edge of floor of a solid ground floor.

(9 marks)

Total 25 marks

Question 3

a) You are a construction project manager overseeing the construction of a new eco-friendly apartment complex in a remote natural reserve. The project involves designing and constructing the walls of the apartments. What are the key factors that need to be considered when determining the design and functional requirements for wall construction in a building project?

(10 marks)

b) Write a short note on clay bricks, calcium silicate bricks, and concrete bricks. Describe the distinctive features of each type.

(9 marks)

c) List any FOUR types of bonds commonly used in brick wall construction. Provide a labelled illustrations of these four types of bonds, showcasing their specific patterns.

(6 marks)

Total 25 marks

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Question 4

- a) Explain the structural principles of a truss rafter roof. Draw a section through a truss rafter roof including the eaves detail annotating all component parts.

(12 marks)

- b) **Figure 2** illustrates a staircase. Annotate the diagram. Explain any FOUR parts of the stair.

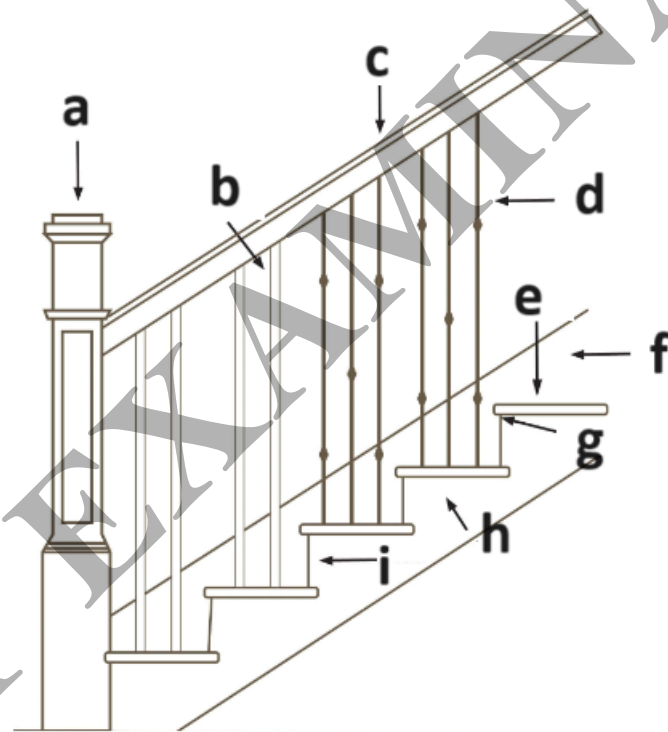


Figure 2

(13 marks)

Total 25 marks

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Question 5

A brass wire of length 2 m has its one end fixed to a rigid support, and at the other end, a 4 kg weight is suspended. If the radius of the wire is 0.35 mm, find the extension produced in the wire. $g = 9.8\text{m/s}^2$, $E = 11 \times 10^{10} \text{ N/m}^2$

(10 marks)

b) Describe the wet manufacturing process of Portland cement with a neat flow diagram.

(15 marks)

Total 25 marks

END OF QUESTIONS