1 State **two** factors to be considered when designing axial loaded columns. (2 marks)

2 A timber column of rectangular cross-section is 150 mm wide and 250 mm deep. The maximum allowable bending stress must not exceed 6 N/mm². Determine the maximum bending moment in Nmm that the beam can safely carry. (4 marks)

3 State **two** items of plant or equipment used in the construction of civil engineering superstructures. (2 marks)
4. Explain the importance of the Construction (Design and Management) Regulations (CDM) in relation to civil engineering projects. (6 marks)

5. Identify the construction materials and/or components in Figures A, B and C. (3 marks)

6. Explain the benefits of PAS 1192 in the BIM environment. (4 marks)
A builder has been asked to construct an external patio area at the rear of a domestic property. The area selected for the patio comprises well-drained land that slopes up to a height of 3.5 m in an irregular manner. The intention is to cut back the ground to provide the space required for the patio, and to support the remaining ground with a cantilever retaining wall. The builder intends to consult a civil engineer for advice on the construction of the retaining wall and the preferred materials to use.

a) Produce a simple section through the retaining wall. (3 marks)

b) Explain how the position at which the weight of the wall acts is determined. (3 marks)
c) Discuss the information that the civil engineer must consider when providing the required advice. (12 marks)