

UNIVERSITY OF BOLTON

**SCHOOL OF THE BUILT ENVIRONMENT &
ENGINEERING**

BSc(HONS) IN ARCHITECTURAL TECHNOLOGY

BSc(HONS) IN BUILDING SURVEYING AND

PROPERTY MANAGEMENT

BSc(HONS) CIVIL ENGINEERING

BSc(HONS) CONSTRUCTION

BSc(HONS) IN CONSTRUCTION MANAGEMENT

BSc(HONS) IN QUANTITY SURVEYING AND

COMMERCIAL MANAGEMENT

SEMESTER ONE EXAMINATION 2008/2009

CONSTRUCTION AND MATERIALS TECHNOLOGY

MODULE NO: BLT1003

Date: Monday 19 January 2009

Time: 10.00 am – 1.00 pm

INSTRUCTIONS TO CANDIDATES:

There are SIX questions.

Answer ANY FIVE questions.

Answer Section A and Section B questions in separate answer books.

All questions carry equal marks.

All working must be shown.

Marks for parts of questions are shown in brackets.

All answers should include reference to relevant aspects of health and safety in construction and well annotated sketches.

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SECTION A

Q1

Piled foundations carry loads from a structure and transfer them into the ground, in such a manner as to avoid settlement of the structure and failure of the ground. Using well annotated sketches, discuss how each type of load transfer system is achieved and indicate the most applicable subsoils for each type.

Total 20 marks

Q2

Groundwater occurs naturally within most subsoils and can cause problems such as flooding of the site and in particular excavations, this has the risk of undermining the sides of the excavation and thus causing safety issues.

Groundwater control systems are usually classified as “temporary” or “permanent”. Compare and contrast these two classifications, explaining the circumstances under which each would be considered most applicable. Illustrate your answer with well annotated sketches.

Total 20 marks

Q3

(a) With regard to domestic house construction, explain the differences between traditional brickwork / blockwork construction and timber framed construction. Include both the merits and limitations of both construction processes.

(5 marks)

(b) Sketch the typical detail for domestic housing, using timber framed construction at the following locations:-

- | | | |
|-------|---|-----------|
| (i) | Frame to ground floor / foundation connection | (5 marks) |
| (ii) | Head of window and door openings | (5 marks) |
| (iii) | Eaves detail | (5 marks) |

Total 20 marks

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SECTION B**Q4**

- (a) A high-tensile steel bolt is to be used for the purpose of anchorage and hence resist applied tensile loading. Using the information tabulated below, calculate the following parameters:-

Mass	384 gms
Length	350 mm
Density	7850 kg/m ³
Young's Modulus of Elasticity	206.7 kN/mm ²
Strain	9.396 X 10 ⁻⁴

- (i) Maximum tensile stress applied.
- (ii) Minimum bolt diameter to resist the stress.
- (iii) Ultimate tensile load accommodated.
- (iv) Maximum extension produced.

(10 marks)

- (b) Generally, carbon is the most important commercial steel alloy, however carbon content can be both a blessing and a curse when it comes to commercial steel - Expand on this statement.

(5 marks)

- (c) Summarise the classifications of failure which is preceded by plastic deformation and illustrate your answer with an appropriate, well annotated sketch.

(5 marks)

Total 20 marks**Please turn the page**

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Q5

During the construction of a concrete pavement samples were taken from the concrete for fresh concrete testing. The following data has been collected:

Table 1: Slump test

Date	Time	Temp	Slump value	Slump mode
3 Nov 2008	10:30 AM	4 °C	50 mm	True

Table 2: Degree of Compactability test

Container				Distance "s" *			
Height	Length	Width	Weight	s1	s2	s3	s4
mm	mm	mm	g	mm	mm	mm	mm
400	200	200	5650	34	34	37	35

* Distance "s" is the distance from the surface of the compacted concrete to the upper edges of the container.

- (a) Using neat sketches explain the difference between true and shear slump. Discuss the significance of each mode. Would you suggest modification to the mix in each case? (4 marks)
- (b) Calculate the degree of compactability for the concrete (4 marks)
- (c) If the weight of the container after compaction of concrete was 40.69 kg, calculate the wet density of the compacted concrete, expressed in kg/m^3 (6 marks)
- (d) The designer of this concrete mix required three types of admixtures to be used. One of these was a water reducing agent. What other two admixtures would be appropriate? (4 marks)

Total 20 marks

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Q6

(a) Define the processes of “anisotropy” and “hygroscopy” with regard to timber
(4 marks)

(b) From a durability point of view, describe the performance of timber in fire conditions.
(6 marks)

(c) A bricklayer has been asked to build a masonry wall between two concrete columns using standard clay masonry units. If:-
the clear distance between the two columns is 4.50 m,
the height of the wall is 3.30 m, and
the thickness of the wall is 0.102 m

i) What bond method/s can the bricklayer use to construct this wall?
(2 marks)

ii) How many masonry units will the bricklayer need for this wall?
(4 marks)

iii) What will be the quantity of mixed mortar used to complete this wall?
(4 marks)

Total 20 marks

END OF QUESTIONS