UNIVERSITY OF BOLTON

SCHOOL OF THE BUILT ENVIRONMENT & ENGINEERING – RAK CAMPUS

BSc(HONS) ARCHITECTURAL TECHNOLOGY
BSc(HONS) BUILDING SURVEYING AND PROPERTY MANAGEMENT
BSc(HONS) CONSTRUCTION MANAGEMENT
BSc (HONS) CIVIL ENGINEERING
BSc(HONS) QUANTITY SURVEYING AND COMMERCIAL MANAGEMENT

SEMESTER ONE EXAMINATION 2010/2011

CONSTRUCTION AND MATERIALS TECHNOLOGY

MODULE NO: BLT1003

Date: Friday 21 January 2011 **Time: 2.00 pm – 5.00 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

There are two main types of ground floors used in domestic dwellings, ground bearing slabs and suspended slabs/floors.

Describe in detail the main components of each type of floor and illustrate your answer with annotated sketches of each type.

(10 Marks for each type)

Total 20 Marks

Q2

The majority of new houses built in this country still use a trussed rafter system for the roof structure.

Explain the advantages and disadvantages of using this system against the traditional purlin and rafter method.

20 marks

Q3

(a) With regard to domestic house construction, explain the differences between traditional brickwork / blockwork construction and the use of 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) You are responsible for the specification of materials for several construction projects and have selected **concrete** as the main structural material on a particular project. Compose and contrast your selection of **concrete** in favour of other construction materials.

(6 marks)

(b) Using neat sketches explain three different modes of slump yielded by fresh concrete. Discuss the significance of each mode and state what modification (if any) to the concrete mix you would suggest based on the mode of slump.

(6 marks)

(c) Define the processes of “hygroscopy” and “anisotropy” with regard to timber.

(4 marks)

(d) Explain one process of insect attack on timber. List the main types of insect that attack timber in this country.

(4 marks)

Total 20 marks

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Q5

(a) Describe the processes involved in the manufacture of clay masonry units, identifying the chemical changes undergone by the clay.

(6 marks)

(b) Workability and durability against frost attack are important properties of masonry mortar. Explain how you could improve these two properties for Portland cement mortar.

(4 marks)

(c) The total volume of pores present in a masonry specimen can be estimated by the volume of water absorbed to saturate the specimen from its dry condition. Use the data shown in Table 5-1 to calculate the percentage of volume of pores present in each masonry unit, Porosity %.

(10 marks)

Table 5-1: Physical properties of masonry units

	Common Masonry Unit	**Engineering Masonry Unit**
Length (mm)	215	216
Width (mm)	100	99
Depth (mm)	65	65
Dry mass (g)	3065	2480
Saturated mass (g)	3189	2561
Description of Holes/Frog	None	Three holes all the way through the depth, each hole has a diameter of 38mm

Total 20 marks

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Q6

(a) Discuss the difference between structure sensitive and insensitive properties of metals. Give examples of two properties in each case and discuss the effect of the composition of the metal on these properties.

(6 marks)

(b) The data shown in Table 6-1 is collected during testing a sample of an aluminium pipe in tension. The pipe has an internal diameter of 30mm and the wall thickness "t" is 2mm, as shown in Figure 6-1. The original gauge length was 200mm. The test was continued to fracture. After fracture, the separate pieces were held together and the gauge length measured as 210mm.

Table 6-1: Data from tension test

Extension (mm)	Load (kN)	Extension (mm)	Load (kN)
0.00	0	1.25	41.0
0.25	8.6	1.50	45.3
0.50	17.3	1.75	47.4
0.75	25.9	2.00	48.3
1.00	34.5	2.25	48.5

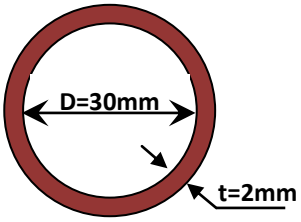

Figure 6-1: Cross section of the aluminium pipe

(i) Plot the stress-strain curve for the material.

(10 marks)

(ii) Determine the elastic modulus for the material.

(2 marks)

(iii) Calculate the strain at fracture.

(2 marks)

Total 20 marks

END OF QUESTIONS