UNIVERSITY OF BOLTON

SCHOOL OF THE BUILT ENVIRONMENT & ENGINEERING

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

SEMESTER ONE EXAMINATION 2010/2011

BUILDING AND ENVIRONMENTAL TECHNOLOGY

MODULE NO: BLT2002

Date: Tuesday 18 January 2011 **Time: 2.00 pm – 5.00 pm**

INSTRUCTIONS TO CANDIDATES:

There are SIX questions.

Answer ANY FIVE questions from Section A and B.

All questions carry equal marks.

Marks for parts of questions are shown in brackets.

Use one answer book for questions from Section A and one answer book for questions from Section B.

School of the Built Environment & Engineering
BSc(Hons) AT/BSPM/CM/QSCM
Semester One Examination 2010/2011
Building and Environmental Technology
Module No. BLT2002

SECTION A

Questions 1,2,3 in section A only relate to the development of a proposed six storey office block

Scenario

A six storey office block of contemporary design is to be constructed in the middle of a city centre. The office block is to include a basement that will be used as an archive store for important legal documents. The superstructure consists of steel frame construction, sustainable flat roof and modern contemporary envelope system. The office block is not connected to any existing buildings but is surrounded by busy city centre roads with other multi-storey blocks on the opposite side of the roads.

1. The subsoil ground conditions consist of 2000mm of fill consisting of brick rubble from a former Victorian building. Below which is a soft layer of shrinkable clay approximately 2500mm deep. Gravel is reached at 4500mm below the ground and is approximately 8000mm deep across the whole site. The water table is at 2500mm below the ground level. Formation level is 5000 mm below ground level.

a. Discuss a suitable proposal for the basement construction in relation to the subsoil conditions, site location and proposed use as an archive storage area in the basement.

(10 marks)

b. Draw a detailed section through the basement wall and floor construction for the proposal discussed in (a) showing all details of construction including methods of ground water exclusion.

(10 marks)

Total 20 marks

Please turn the page

School of the Built Environment & Engineering
BSc(Hons) AT/BSPM/CM/QSCM
Semester One Examination 2010/2011
Building and Environmental Technology
Module No. BLT2002

2. The office development is to be constructed using a hot rolled steel frame structure.

a. Discuss the merits of using steel frame construction for the proposed office development.

(10 marks)

b. Explain with the aid of sketches two methods that can be employed to provide lateral wind restraint to the six storey steel frame office block.

(10 marks)

Total 20 marks

Please turn the page

School of the Built Environment & Engineering
BSc(Hons) AT/BSPM/CM/QSCM
Semester One Examination 2010/2011
Building and Environmental Technology
Module No. BLT2002

3. a. Discuss four options that could be used to construct the floors of the office block comparing the advantages and disadvantages of each option.

(10 marks)

b. Produce drawn details through two types of floor construction discussed above. Drawing should be fully annotated showing all component parts in the correct location.

(10 marks)

Total 20 marks

Please turn the page

School of the Built Environment & Engineering
BSc(Hons) AT/BSPM/CM/QSCM
Semester One Examination 2010/2011
Building and Environmental Technology
Module No. BLT2002

SECTION B

4. a. Explain how electricity is generated and transmitted to the final user. Within your answer you must provide a block diagram that illustrates a typical distribution network.

(10 marks)

b. Discuss the advantages and disadvantages of using micro-generation to provide an electrical supply to an average domestic property in the UK.

(10 marks)

Total 20 marks

5. a. Under what circumstances may drains and sewers become damaged during their construction and service period?

(6 marks)

b. With the aid of sketches describe the materials and jointing techniques for the pipework used to provide underground drainage.

(6 marks)

c. Name and state the three available methods of testing underground drainage. Select one of the test methods and, with the aid of sketches, describe how the test is undertaken along with any precautionary measures.

(8 marks)

Total 20 marks

Please turn the page

School of the Built Environment & Engineering
BSc(Hons) AT/BSPM/CM/QSCM
Semester One Examination 2010/2011
Building and Environmental Technology
Module No. BLT2002

6. Using the information provided in the tables below find the rating, in Watts (W), of the heat emitter required to heat the lounge of the bungalow shown in Figure 1. Consider the external temperature to be -1 ^{o}C.

20 marks

Construction	**U Value ($W/m^2\,^oC$)**
External solid wall	2.0
External cavity wall	1.0
External cavity wall (filled)	0.5
External timber wall	0.6
Internal wall	2.2
Door	4.0
Single glazing	5.7
Double glazing	3.0
Ground floor, solid	0.45
Ground floor, timber	0.62
Intermediate floor, heat flow up	1.7
Intermediate floor, heat flow down	1.5
Flat roof	1.5
Pitched roof (100mm insulation)	0.34
Pitched roof (no insulation)	2.2

Table 1 – <u>Approximate U Values through building fabric</u>

Question 6 continued over the page…

School of the Built Environment & Engineering
BSc(Hons) AT/BSPM/CM/QSCM
Semester One Examination 2010/2011
Building and Environmental Technology
Module No. BLT2002

Question 6 continued

Room	Ventilation rate (air changes per hour)
Living	1.5
Dining	1.5
Bedroom	1.0
Hall / landing	1.5
Bathroom	2.0
Toilet	2.0
Kitchen	2.0

Table 2 – Ventilation rates

Question 6 continued over the page…

School of the Built Environment & Engineering
BSc(Hons) AT/BSPM/CM/QSCM
Semester One Examination 2010/2011
Building and Environmental Technology
Module No. BLT2002

Question 6 continued

Formula sheet - Radiator sizing (Question 6)

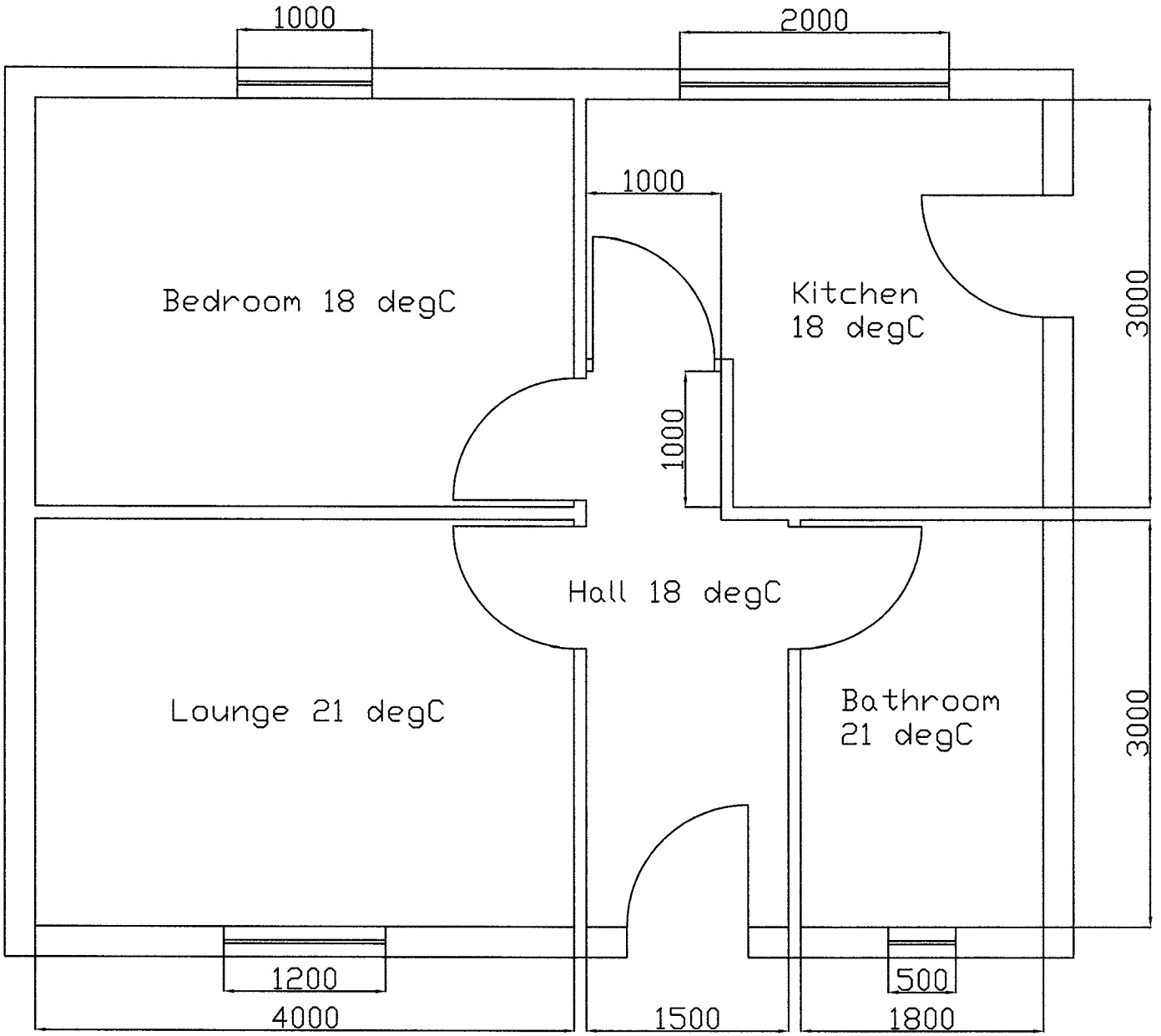
Fabric losses

Surface area (m^2)	X	Temperature difference (^oC)	X	U value ($W/m^2\ ^oC$)	=	Heat loss (W)

Ventilation losses

Volume of room (m_3)	X	Air change rate (per hour)	X	Temperature difference (^oC)	X	Ventilation Factor ($0.33\ W/m^3\ ^oC$)	=	Heat loss (W)

END OF QUESTIONS



Construction details

All dimensions are in mm
Solid external brick wall
Solid floor
Single glazed windows
100mm of insulation in roof space
Room heights 2400mm
Door area 2 sqm
Window height 800mm

Figure 1