X226/301

NATIONAL QUALIFICATIONS 2010

THURSDAY, 10 JUNE
1.00 PM – 3.00 PM

ARCHITECTURAL TECHNOLOGY
HIGHER

100 marks are allocated to this paper.

Answer **all** questions in Section A (40 marks).

Answer **two** questions from Section B (30 marks each).

An Ordnance Survey Sitemap is provided for use with the following questions, 12(*a*), (*b*), (*c*), (*d*) and (*e*).

A worksheet is provided for Question 11(*b*).

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Marks

SECTION A

Attempt all the questions in this Section (total 40 marks)

1. Identify **four** *functional requirements* of a domestic building. **4**

2. Briefly explain the term *Buildability*. **4**

3. For **each** of the following *performance requirements* of a building, identify **two** associated *design factors*.

- Architectural
- Comfort
- Economics **6**

4. Identify and briefly explain **three** *technical constraints* that a designer may have to consider in the development of a site for housing. **6**

5. Briefly explain the terms *Eastings* and *Northings* with reference to the Ordnance Survey National Grid. **4**

6. State the scale at which Ordnance Survey Superplans are normally produced. **2**

7. In surveying, what is meant by the term *Ordnance Datum*? **2**

8. (*a*) A survey line, AB, has been measured by step taping with step lengths of 11·86, 12·42, 16·21 and 7·67 m. Calculate the horizontal plan length of line AB. **2**

(*b*) If the vertical difference between A and B is 8·712 m, determine the average gradient between A and B. **4**

9. With reference to linear measurement surveying, briefly explain the meaning of **each** of the following terms.

- Trilateration
- Base line
- Offsetting **6**

(40)

[*END OF SECTION A*]

SECTION B

Attempt any TWO questions in this Section (total 60 marks)

10. (*a*) When using steel tapes for surveying, errors in measurement can arise from many sources.

(i) Explain how you would ensure that measurement error due to incorrect tape tension is kept within acceptable limits when using a steel tape. **4**

(ii) Identify **two** other possible sources of error that may occur, apart from that mentioned in part (i), when determining horizontal lengths by means of a steel tape. **2**

(iii) A line is measured with a 50 m steel tape and is found to be 328·296 m long. A *standardisation* check on the tape shows it to be actually 50·029 m long. Calculate the error in the measured line and the correct length of the line. **4**

(*b*) Briefly describe the use of ranging poles and survey arrows when measuring lines in a linear survey. **4**

(*c*) For each material listed below, briefly describe **two advantageous properties** of the materials which make them suitable for their location and **one disadvantageous property** which may compromise their use.

(i) Facing brick to outer leaf of cavity wall **3**

(ii) Timber frame inner leaf to cavity wall **3**

(iii) Foamed polyurethane insulation to cavity wall **3**

(iv) Mass concrete in foundations **3**

(*d*) Briefly explain **two** procedures to ensure quality that could help reduce defects and improve building performance. **4**

(30)

[Turn over

Marks

11. (*a*) Briefly describe the set up procedure for a *three-screw automatic level and tripod* prior to taking readings for a levelling survey. **6**

(*b*) **Worksheet Q11(b)** shows the booking and notes taken during a levelling survey along the line of a proposed sewer. On the **Worksheet** carry out the following tasks.

(i) Reduce the levels (using Collimation or Rise and Fall method). **8**

(ii) Perform an arithmetical check and state the closing error. **2**

(*c*) The Construction Industry is increasingly aware of the interaction between the *built and natural environments*.

Identify **four** examples of how the Construction Industry impacts on the natural environment and briefly explain what steps are being taken to reduce the damage. **8**

(*d*) For **each** of the following structural elements, identify **two** main performance requirements and **one** associated design principle.

(i) Foundations **3**

(ii) External Walls **3**

(30)

Marks

12. Refer to the enclosed scale Ordnance Survey Sitemap and answer the following questions.

(*a*) Identify the building that has the 10 m grid reference 78140157. **2**

(*b*) State the 1 m grid reference of the war memorial on the Haugh. **2**

(*c*) State the meaning of **four** symbols contained in grid square 779016. **4**

(*d*) Determine the average gradient of Perth Road (B8033) from its junction with Beech Road at grid reference 7825700970 to the point at grid reference 7855501261. **4**

(*e*) Briefly identify **four** items of detail in grid square 781012. **4**

(*f*) State **four** *functions/performance requirements* of the roof to a domestic building. **4**

(*g*) Describe, with the aid of an annotated sketch, a domestic pitched **cold roof** showing each of the following in its appropriate location:

- insulation
- ventilation
- ceiling finish
- roof structure
- roof covering. **10**

(30)

[*END OF SECTION B*]

[*END OF QUESTION PAPER*]

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FOR OFFICIAL USE

Mark

X226/302

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ARCHITECTURAL TECHNOLOGY
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Worksheet for Question 11(*b*)

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Date of birth

Day Month Year

Scottish candidate number

Number of seat

To be inserted inside the front cover of the candidate's answer book and returned with it.

WORKSHEET Q11(*b*)

(i) Reduction

All entries in metres

Back Sight	Inter Sight	Fore Sight	Ht of Collimation (or) Rise & Fall	Reduced Level	Remarks
0·970					**TBM 45·215**
	1·355				**Point A** Chainage 0 m
	1·827				Chainage 30 m
	1·486				Chainage 60 m
1·655		**2·280**			**Change point B** Chainage 90 m
2·790		**0·375**			**Change point C** Chainage 120 m
1·860		**1·075**			**Change point D** Chainage 150 m
	0·505				Chainage 180 m
	0·946				Chainage 210 m
0·830		**2·135**			**Change point E** Chainage 240 m
		2·230			**TBM 45·215**

(ii) Arithmetic check and closing error

[*END OF WORKSHEET*]