

FORM TP 2012051



TEST CODE **01308020**

MAY/JUNE 2012

**C A R I B B E A N   E X A M I N A T I O N S   C O U N C I L**

**SECONDARY EDUCATION CERTIFICATE  
EXAMINATION**

**BUILDING TECHNOLOGY**

**OPTION II – CONSTRUCTION**

**Paper 02 – Technical Proficiency**

*2 hours 30 minutes*

**21 MAY 2012 (p.m.)**

**READ THE FOLLOWING INSTRUCTIONS CAREFULLY.**

1. This paper consists of THREE sections. You MUST answer FIVE questions.  
SECTION A: You must answer the only COMPULSORY question in this section.  
SECTION B: You must answer THREE questions from this section.  
SECTION C: You must answer ONE question from this section.
2. In addition to the 2 hours 30 minutes, you are allowed 10 minutes to read the paper. Writing MAY begin during the 10-minute period.
3. Use sketches where necessary to support your answers.
4. Silent, non-programmable calculators may be used.
5. Only sketches for Question 1 should be done on the drawing sheets provided. ALL other sketches should be done in the answer booklet.

**DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.**

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**BUILDING TECHNOLOGY CONSTRUCTION**

**LIST OF FORMULAE**

Candidates should refer to the following list of formulae for assistance in answering questions.

TRUE LENGTH OF COMMON RAFTER WITH OVERHANG

$$\text{Overhang} = \text{Rise/Run} = X/\text{Overhang}$$

$$\text{Value of } X = (\text{Rise} \times \text{Overhang}) \div \text{Run}$$

$$\text{Value of } X + \text{Original Rise} = \text{Total Rise}$$

$$\text{Run} + \text{Given Overhang} = \text{Total Run}$$

Using Pythagoras' Theorem

$$\text{True Length of Rafter} = \sqrt{\text{Total Rise}^2 + \text{Total Run}^2}$$

Formula for calculating tread and riser dimensions

$$2R + T \text{ OR } 2R + G = 550 \text{ mm to } 700 \text{ mm}$$

Where R = rise, G = going and T = tread

$$\frac{\text{Rise}}{\text{Span}} = \text{Pitch}$$

$$\frac{\text{Area of wall}}{\text{Area of block}} = \text{No. of blocks}$$

$$\% \text{ Moisture Content} = \frac{\text{Wet Weight} - \text{Dry Weight}}{\text{Dry Weight}} \times 100$$

$$\frac{\text{Span in mm}}{24} + 50 \text{ mm} = \text{Depth in mm}$$

This paper contains metric dimensions only. You should work your answers in the metric system.

SECTION A

You are allowed to use EITHER free-hand OR rule-assisted sketches to answer this question, which is based on MODULES D5 to D9 of the syllabus – Walls, Floors, Roofs, Windows, Doors and Stairs. All sketches should be done to proportion. This question is worth 40 marks.

You are advised not to spend more than 50 minutes on this question.

1. **Figure 1** shows the floor plan of a small office with external walls built of 150 mm hollow concrete blocks and plastered on both sides. The floor is a 100 mm thick reinforced concrete slab on grade and is finished with a 10 mm cement/sand screed. All the windows are of the type shown in **Figure 1.1** and the entrance doors are of the type shown in **Figure 1.2**.

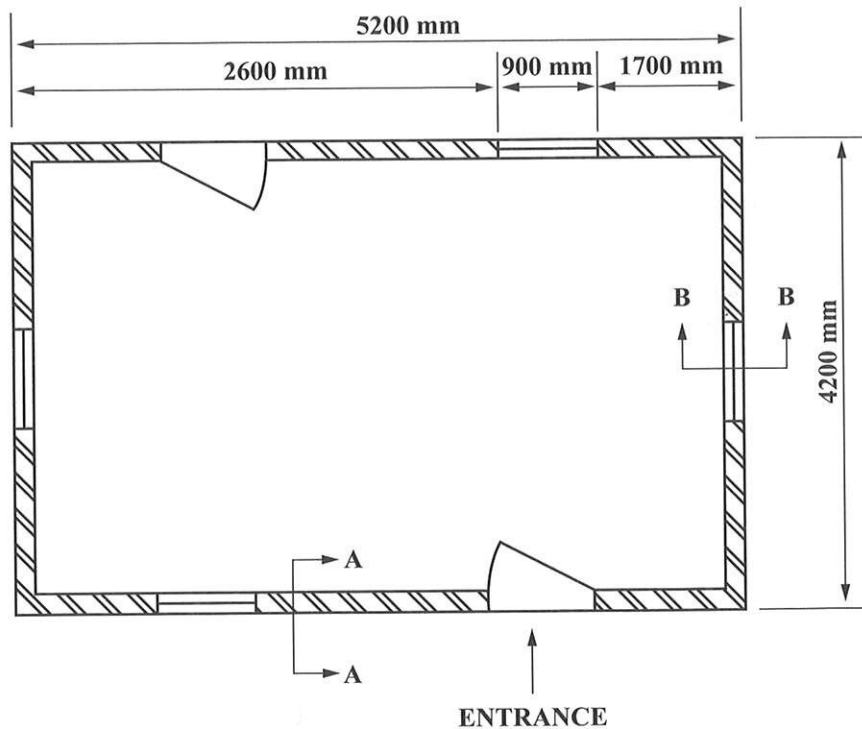
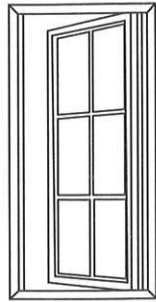
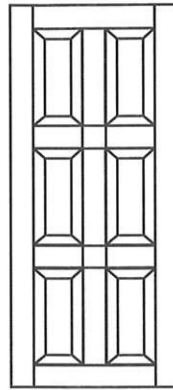


Figure 1. Floor plan



**Figure 1.1. Window**



**Figure 1.2. Door**

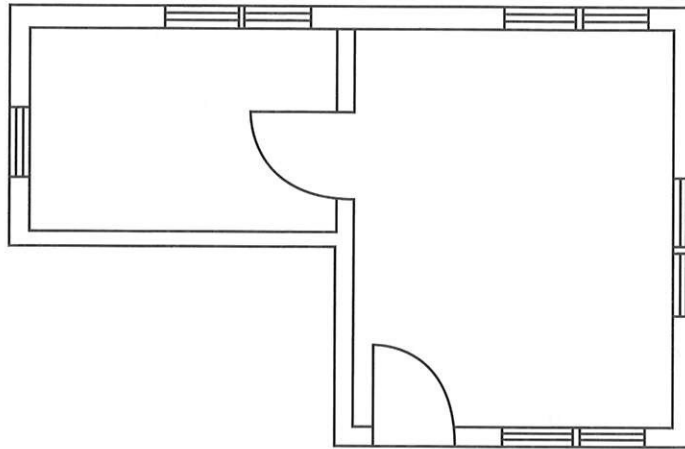
- (a) (i) Produce a neat sketch of the vertical section at **A-A** as shown on the floor plan in **Figure 1** to show details of the reinforced concrete slab on grade. **(10 marks)**
- NOTE:** Details of the foundation are NOT required.
- (ii) Label FIVE parts of the reinforced concrete floor slab. **(5 marks)**
- (b) (i) Sketch a neat vertical section at **B-B** on the floor plan in **Figure 1** to show details of the window and frame in the concrete wall. **(10 marks)**
- NOTE:** Details of the roof are NOT required.
- (ii) Label FOUR parts of the detailed sketch produced in (b) (i) above. **(4 marks)**
- (c) State the name of the type of window shown in **Figure 1.1**. **(1 mark)**
- (d) State the name of the type of door shown in **Figure 1.2**. **(1 mark)**
- (e) State THREE functions of the door. **(3 marks)**
- (f) Name THREE types of ironmongery designed for use on the door. **(3 marks)**
- (g) State THREE tools required to plaster the walls in **Figure 1**. **(3 marks)**

**Total 40 marks**

**SECTION B**

**You are required to answer any THREE questions from this section. EACH question is worth 20 marks.**

2. (a) State THREE reasons for stripping a building site. **(3 marks)**
- (b) (i) State FOUR temporary services a well-managed site should provide. **(4 marks)**
- (ii) State THREE reasons for hoarding a building site. **(3 marks)**
- (c) With the aid of labelled, single-line sketches, explain EACH of the following:
- (i) How corner profiles are positioned when setting out the small building in **Figure 2**



**Figure 2. Small building**

- (6 marks)**
- (ii) TWO methods of ensuring that the corners of the building are square **(4 marks)**

**Total 20 marks**

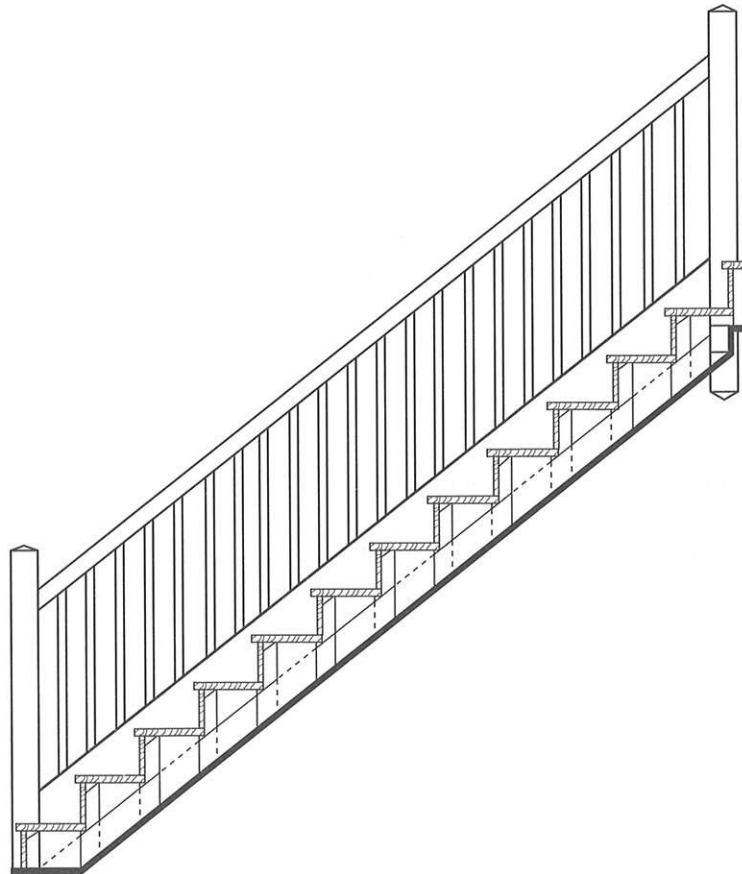
3. (a) State THREE characteristics of aggregates used in concrete. (3 marks)
- (b) Define the term 'proportioning' or 'batching' in relation to a concrete mix. (2 marks)
- (c) Briefly explain EACH of the following terms in relation to timber:
- (i) Moisture content (2 marks)
  - (ii) Conversion (2 marks)
  - (iii) Seasoning (2 marks)
  - (iv) Dry rot (2 marks)
  - (v) Preservatives (2 marks)
- (d) List FIVE uses of plastics in the building construction industry. (5 marks)

**Total 20 marks**

4. (a) State the MAIN purpose of a slump test. (2 marks)
- (b) With the aid of labelled sketches, show in sequence, the THREE steps involved in conducting a slump test for a concrete mix. (6 marks)
- (c) Use sketches to illustrate EACH of the following:
- (i) Collapsed slump (2 marks)
  - (ii) True slump (2 marks)
- (d) State THREE functions of foundations. (3 marks)
- (e) Name FIVE different types of foundations. (5 marks)

**Total 20 marks**

5. (a) State the MAIN function of a staircase. (2 marks)
- (b) Define EACH of the following:
- (i) Riser (1 mark)
  - (ii) Tread (1 mark)
  - (iii) Headroom (1 mark)
  - (iv) String (1 mark)
  - (v) Handrail (1 mark)
- (c) State THREE critical measurements that must be obtained when designing a staircase. (3 marks)
- (d) **Figure 3** shows a section through the staircase with a housed string.



**Figure 3. Section of staircase**

Use labelled sketches to show details of how a riser and a tread are connected to

- (i) the string (5 marks)
- (ii) each other. (5 marks)

**NOTE:** You are NOT required to reproduce the sketch of the staircase shown on page 8.

**Total 20 marks**

6. (a) Make line diagrams to illustrate elevations of EACH of the following types of roofs.
- (i) Lean-to roof (2 marks)
  - (ii) Couple roof (2 marks)
  - (iii) Close-coupled roof (2 marks)
- (b) Make line diagrams to illustrate elevations of EACH of the following types of roofs.
- (i) Hip roof (2 marks)
  - (ii) Hip and valley roof (2 marks)
- (c) List THREE advantages of truss roof construction over traditional roof construction. (3 marks)
- (d) State TWO methods of applying paint to a concrete surface. (2 marks)
- (e) List, in CORRECT sequence, the steps in preparing a new wood surface before applying varnish. (5 marks)

**Total 20 marks**



**SECTION C**

**You are required to answer ONE question from this section. EACH question is worth 20 marks.**

7. (a) Use a suitable sketch to show a vertical section through a soakaway. **(6 marks)**
- (b) Briefly explain ONE advantage and ONE disadvantage of EACH of the following drainage systems:
- (i) A combined system **(2 marks)**
  - (ii) A separate system **(2 marks)**
- (c) Define EACH of the following terms:
- (i) Cesspool **(2 marks)**
  - (ii) Surface-water drain **(2 marks)**
  - (iii) Sewer **(2 marks)**
  - (iv) Sewage **(2 marks)**
  - (v) Drain pipe **(2 marks)**

**Total 20 marks**

8. (a) State TWO functions of EACH of the following skilled persons in the building trades:
- (i) Plumber **(2 marks)**
  - (ii) Carpenter **(2 marks)**
  - (iii) Electrician **(2 marks)**
  - (iv) Painter **(2 marks)**
  - (v) Mason **(2 marks)**

- (b) (i) Use a simple flow chart to arrange the members of the building team listed below to show their line of authority on a building site.
- a) General foreman (1 mark)
  - b) Clerk of works (1 mark)
  - c) Engineer (1 mark)
  - d) Client (1 mark)
  - e) Building contractor (1 mark)
  - f) Architect (1 mark)
  - g) Quantity surveyor (1 mark)
- (ii) Select THREE members of the building team given in (b) (i) above and state ONE function of EACH. (3 marks)

**Total 20 marks**

9. (a) Outline FIVE factors which influence the design of a building. (10 marks)
- (b) (i) List FIVE English architectural features and/or building materials that have influenced building styles in the Caribbean. (5 marks)
- (ii) List FIVE American architectural features and/or building materials that have influenced building styles in the Caribbean. (5 marks)

**Total 20 marks**

**END OF TEST**

**IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.**