



**6720-550 MARCH 2018**

**Level 3 Advanced Technical Extended Diploma in Constructing the Built Environment (Civil Engineering) (720)**

Level 3 Constructing the Built Environment – Theory Exam

If provided, stick your candidate barcode label here.

**Friday 23 March 2018**  
**09:30 – 11:30**

Candidate name (first, last)

First

Last

Candidate enrolment number

Date of birth (DDMMYYYY)

Gender (M/F)

Assessment date (DDMMYYYY)

Centre number

Candidate signature and declaration\*

• If any additional answer sheets are used, enter the additional number of pages in this box.

• Please ensure that you **staple** additional answer sheets to the **back** of this answer booklet, clearly labelling them with your full name, enrolment number, centre number and qualification number in BLOCK CAPITALS.

• All candidates need to use a **black/blue pen**. **Do not** use a pencil or gel pen.

• If provided with source documents, these documents **will not** be returned to City & Guilds, and will be shredded. **Do not** write on the source documents.

**\*I declare that I had no prior knowledge of the questions in this assessment and that I will not divulge to any person any information about the questions.**

**You should have the following for this examination**

- a pen with blue or black ink
- a pencil
- a ruler
- a non-programmable calculator

**General instructions**

**This question paper is the property of City and Guilds of London and should be returned after the examination.**

- This examination contains **15** questions. Answer **all** questions.
  - Answer the questions in the space provided.
  - The marks for each question are shown in brackets.
- Show **all** calculations.



1 a) Define the term triangulation as used in surveying. (2 marks)

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b) Define GIS as used in surveying. (2 marks)

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2 Describe the purpose of a TBM in surveying. (2 marks)

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3 Explain **one** reason why a site surveyor might choose to use a total station to perform a land survey. (2 marks)

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5 State the technical term used for loads that are

a) concentrated at one place

(1 mark)

\_\_\_\_\_

b) spread out over an area.

(1 mark)

\_\_\_\_\_

6 For the simply supported beam shown in Figure 1:

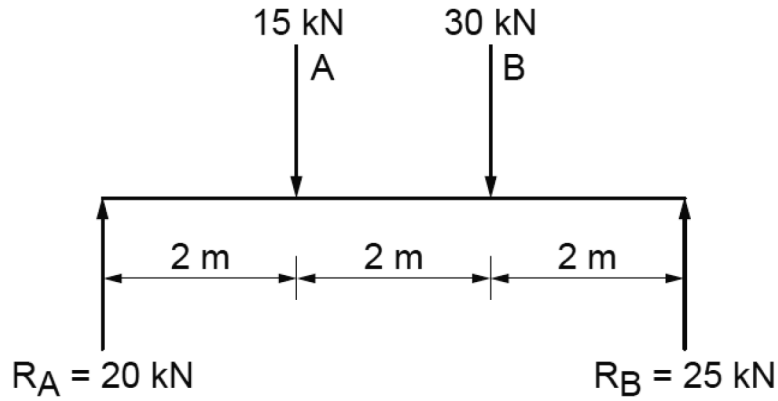


Figure 1

a) Determine the bending moment (BM) values at points A and B.

(2 marks)

\_\_\_\_\_  
\_\_\_\_\_

b) Produce a BM diagram for the beam.

(2 marks)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7 State the meaning of **three** of the terms of the bending theory equation shown below.

$$\frac{M}{f} = \frac{I}{y}$$

(3 marks)

M = \_\_\_\_\_

f = \_\_\_\_\_

I = \_\_\_\_\_

- 8 State the units for:
- a) first moment of area (1 mark)
  - b) second moment of area. (1 mark)

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9 With reference to the section shown in Figure 2:

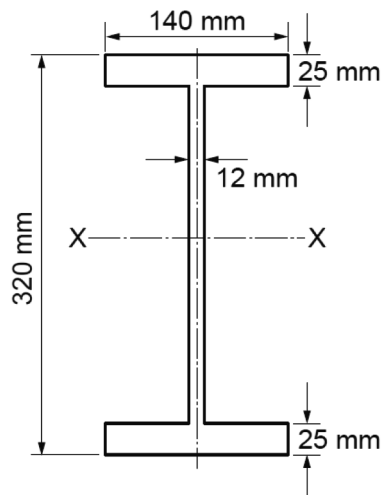


Figure 2

- a) Calculate the moment of inertia about the x-x axis. (4 marks)
- b) Determine the moment of resistance of the beam, if the maximum bending stress in either tension or compression is  $165 \text{ N/mm}^2$ . (3 marks)

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- 10 An excavation is to take place on a site with a foundation of depth 1.5 m.  
 A site investigation has confirmed the presence of gas pipes in the ground.  
 a) Identify **one** risk associated with the gas pipe to those working on site. (1 mark)

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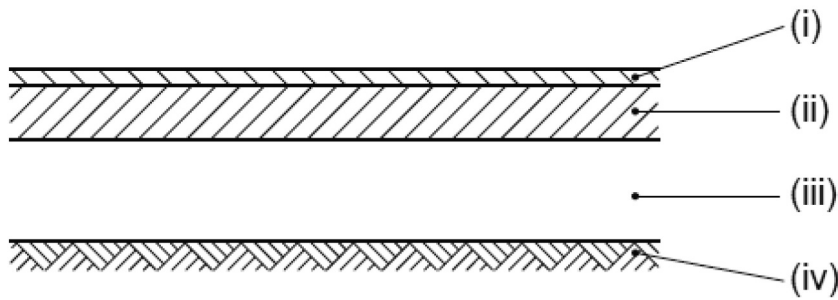
- b) Identify **one** control measure to minimize the risk. (1 mark)

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- 11 Name the **four** components of the flexible highway construction shown in Figure 3. (4 marks)



**Figure 3**

i) \_\_\_\_\_

ii) \_\_\_\_\_

iii) \_\_\_\_\_

iv) \_\_\_\_\_

- 12 Explain **one** disadvantage of a rigid highway construction form. (2 marks)

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13 A fast food chain intends to build a number of new outlets. These outlets will have a pre-fabricated structural steel frame and will be delivered to the site ready for erection.

a) Name **two** items of health and safety legislation which should be applied during the design and construction phases of the project.

(2 marks)

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b) Explain why a pre-fabricated structural steel frame has been specified for the outlets.

(4 marks)

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14 Explain why a pile foundation would be preferred to a strip foundation for the construction of a low-rise commercial building.

(4 marks)

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15 A developer has planning permission for a three-storey office block. This is to be built from concrete cast in situ. The new building will be rectangular and have plan dimensions of 85 m x 25 m.

a) Explain how the datum is transferred from an Ordnance Survey Bench Mark (OSBM) to Temporary Bench Marks (TBMs) on the four corners of the site.

(3 marks)

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b) Discuss how the decision to use concrete, cast in situ, will affect the design and construction of the structure.

(9 marks)

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