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6720-550 JUNE 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 22 June 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. 0 0
- 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
- non-programmable scientific calculator
- a pen with blue or black ink
- a pencil and ruler

General instructions
This question paper is the property of City and Guilds of London and should be returned after the examination.
- This examination contains **20** questions. Answer **all** questions.
  - Answer the questions in the space provided.
  - The marks for **each** question are shown in brackets.
- Show **all** calculations.

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1 Describe what is meant by the term 'levelling' as used in land surveying. (2 marks)

2 Name **two** instruments which can be used on construction sites for levelling purposes. (2 marks)

3 Describe the term 'intersection' as used in land surveying. (2 marks)

4 Explain **one** reason why a land surveyor might choose a Global Positioning System (GPS) to survey a large greenfield area of undulating terrain. (2 marks)

5 A horizontal curve of radius 400 m connects two straight sections of road with a deflection angle of 40°, as shown in Figure 1.

The chainage of the intersection point I is 2000 m.

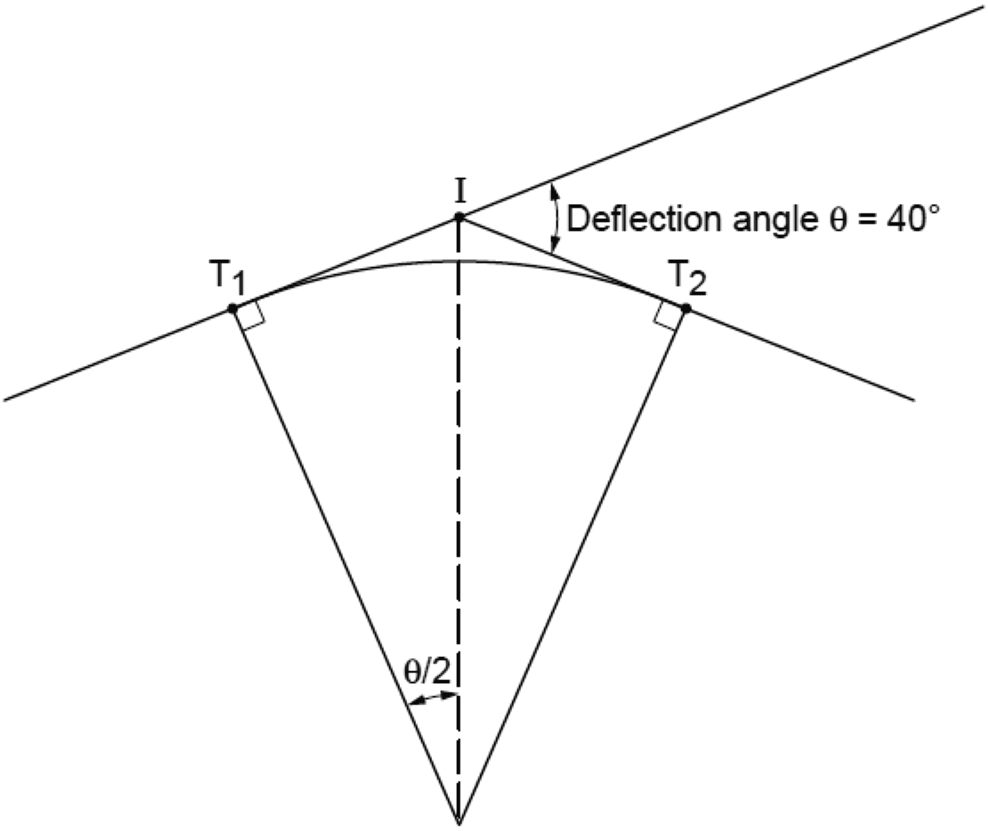

Figure 1

Calculate

a) the length of curve (2 marks)

b) the length of the tangent straight IT_1. (2 marks)

6 Identify **two** of the laws of static equilibrium used to determine beam reactions. (2 marks)

7 For the cantilever beam shown in Figure 2.

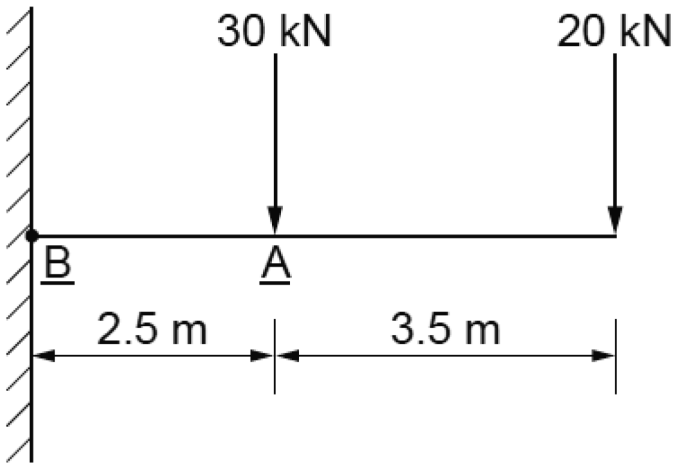

Figure 2

a) Determine the bending moment values at points A and B. (2 marks)

b) Produce a bending moment diagram to represent the loading. (2 marks)

8 Describe **one** effect that eccentric loading has on columns. (2 marks)

9 Determine the safe axial-load for a timber post that is 75 mm square and which has an effective length of 2.5 m, using the table below. You must show **all** calculations. (4 marks)

Slenderness ratio (L/b)	Permissible stress (N/mm^2)
30	8.7
40	11.5

10 State the following modes of failure for a retaining wall.

a) Overturning. (1 mark)

b) Sliding. (1 mark)

11 A retaining wall retains water of density 10 kN/m^3. The height of the wall is 4.5 m.

a) Determine the pressure per linear metre at the base of the wall. (1 mark)

b) Calculate the magnitude of the total force per metre run (F_h) acting on the wall. (2 marks)

12 Name **one** method used to determine forces in statically determinate frameworks. (1 mark)

13 Name **two** temporary methods of groundwater control that can be used on construction sites. (2 marks)

14 Name **two** items of earthworks plant used on construction sites. (2 marks)

15 Describe the purpose of a contraction joint used in rigid pavements. (2 marks)

16 State **two** duties under the Health & Safety at Work Act (HASWA) that **employees** must follow. (2 marks)

17 Explain the advantages of using a caisson as a method of deep excavation for bridge piers. (3 marks)

18 A retail company is planning to build a large new distribution warehouse.

Explain why a steel portal frame may be considered the **best** design option for the building. (3 marks)

19 A developer is keen to incorporate a sustainable urban drainage system (SUDS) into a new eco-village development and is seeking local public opinion on the design of the SUDS.

Evaluate the design considerations the local public may require the developer to consider. (4 marks)

20 A property developer has planning permission to build a large two-storey steel frame sports complex on an undeveloped area of wasteland that has been targeted by the local authority for regeneration. The new building will be rectangular and have plan dimensions of 80 m x 20 m. The site varies in its topographical make-up and includes soil mounding from its previous use as a landfill tip.

a) Explain the process of how to use standard formulae to calculate cut and fill quantities to level the site in preparation for construction activities. (3 marks)

b) Discuss the structural and design issues that will need to be considered for the steel frame. (9 marks)

End of examination