



TQUK Level 3 Diploma in Design, Engineer, Construct: The Digital Built Environment (RQF)

(603/1993/8)

Paper ID: KNIL - 11 Diploma

Assessment date: PASTPAPER2

Please complete the details below using black or blue ink.

Use BLOCK CAPITALS.

You must use the Resource Document provided.

Learner Name: _____

Learner Number: _____

Learner Signature: _____

Centre Name: _____

Centre Number: _____

Instructions:

- Use **black** or **blue** ink.
- Read **each** question carefully.
- Answer **all** questions.
- You should have **2** documents on your desk: this Examination Paper and the Resource Document.

Information:

- You may use a calculator.
- The total mark for this paper is **120 (one hundred and twenty)** marks.
- The marks for **each** question are shown in brackets.
- The use of dictionaries is **not** permitted.
- Use the Resource Document alongside the questions
- Additional writing space can be found on pages **27** and **28**. If you use this, clearly indicate which question number you are answering.

Time allowed: 2 hours.

This paper **MUST** be invigilated in accordance with TQUK Invigilation Requirements.

Do not open this examination paper until you are told to do so.

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Question 1

- 1a.** Identify **one** type of hydrological data collected when producing a hydrology study.

Answer:

[1]

- 1b.** Hydrological data is used as part of a site survey.
Identify **three other** types of data that should be used during a site survey.

Answer:

[3]

Questions continue on the following page

1c. State **four** tools **or** pieces of equipment used during a site survey.

Answer:

[4]

Question 2

2a. Identify **two** features of a shell structure.

Answer:

[2]

2b. Identify **three** features of steel.

Answer:

[3]

Questions continue on the following page

2c. Identify **two** advantages **and two** disadvantages of a mass structure.

Advantages:

[2]

Disadvantages:

[2]

Total for Question = 4 marks

Question 3

3a (i). What is responsible procurement?

Answer:

[1]

3a (ii). Identify **three environmental** reasons to use ethical sourcing practices.

Answer:

[3]

Questions continue on the following page

3b. Explain **three** reasons a construction company would want to minimise waste.

Answer:

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[6]

3c. Look at the Resource Document.

Identify **three** positive and **three** negative impacts a large-scale construction project could have on a local community.

Positive impacts:

[3]

Negative impacts:

[3]

Total for Question = 6 marks

Questions continue on the following page

Question 4

4a (i). What is occupant comfort?

Answer:

[1]

4a (ii). Identify **three** factors that contribute to occupant comfort.

Answer:

[3]

4b. Look at **Table 1** in the Resource Document.

Both toilet spaces in the building require a lux of 200 and use 6-watt LED bulbs.

Calculate the **total number of light bulbs** required for the toilet spaces.

Use: $\text{lumens} = \text{lux} \times \text{area}$

and

Use: bulbs required = lumens required / lumens of 6-watt LED bulbs.

You **must** show your workings.

Answer:

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[6]

Questions continue on the following page

4c. Look at **Table 2** in the Resource Document.

Calculate the lumens required for **cleaning** the auditorium.

Use: lumens required = lux x area.

You **must** show your workings.

Answer:

[2]

4d. Look at the Resource Document.

The auditorium has a wall height of **5.6m**.

Calculate the **volume** in metres cubed (m³) of the auditorium.

Use: room volume = area x height.

You **must** show your workings.

Answer:

[2]

4e. Look at the Resource Document.

The air purification system in the building will filter the air at 256 cubic feet per minute (CFM).

Calculate the air exchange per hour for the **auditorium**.

Use:
$$\frac{CFM \times 60}{Volume \text{ of room}}$$

Give your answer to **one** decimal place.

You **must** show your workings.

Answer:

[2]

Questions continue on the following page

Question 5

- 5a.** Identify **one** way Building Information Modelling (BIM) supports the operation, management **or** maintenance of a sustainable building project during its lifecycle.

Answer:

[1]

- 5b.** Identify **four** benefits of involving the Facilities Manager early in the design process.

Answer:

[4]

- 5c.** Explain **two** reasons why a handover from the construction team to the end user is important.

Answer:

[4]

Questions continue on the following page

5d. Explain **two** benefits of setting targets for energy and / or water consumption.

Answer:

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[6]

Question 6

6a. Look at the Resource Document.

The construction team would like to add an extension to the existing structure.

The team want the **maximum amount of glazing** to be 40% of the floor area, plus the total area of any windows and doors which no longer exist or are no longer exposed.

Calculate the **total glazing allowance** for the extension.

You **must** show your workings.

Answer:

[illegible]

[6]

Questions continue on the following page

6b. A wall in the building has three layers:

Layer	Thermal resistance
Outer brick layer	$R1 = 0.15 \text{ m}^2 \text{ K/WR}$
Insulation layer	$R2 = 2.5 \text{ m}^2 \text{ K/WR}$
Inner plaster layer	$R3 = 0.12 \text{ m}^2 \text{ K/WR}$

The wall has a combined internal and external surface resistance of:

$$R_s = 0.04 \text{ m}^2 \text{ K/WR}$$

Use the **combined** thermal resistance **and** internal and external surface resistance to calculate the **U-value** of the wall.

Use: $U = 1 / R_{\text{Total}}$

You **must** show your workings.

Answer:

[4]

- 6c.** Identify **one** way the orientation of a building affects solar gain **and one** way it affects natural ventilation.

Solar gain:

[1]

Natural ventilation:

[1]

Total for Question = 2 marks

Questions continue on the following page

Question 7

7a. Identify **three** recurrent **fixed** costs in a construction project.

Answer:

[3]

7b. Identify **three** recurrent **variable** costs in a construction project.

Answer:

[3]

7c. Identify **three capital** costs in a construction project.

Answer:

[3]

Questions continue on the following page

Question 8

8a. Look at the Resource Document.

Discuss **two** methods of sustainable construction which could impact the energy performance of the completed construction project.

For **each** method, you should:

- identify what the method is
- identify what impact the method would **typically** have on energy performance
- discuss the impact of the method on the energy performance of the Grade II listed building.

Answer:

Fast pass

[8]

8b (i). Look at the Resource Document.

Describe a suitable **structural method** to use for the **auditorium** of the Grade II listed building.

Answer:

[2]

Questions continue on the following page

8b (ii). Look at the Resource Document.

Use your answer to Question 8b(i).

Give **one** suitable **structural material** you would use in the auditorium.

Structural material:

[1]

Give **one** reason why this material is appropriate for the method you chose in your answer to 8b(i).

Reason:

[1]

Total for Question = 2 marks

8b (iii). Look at the Resource Document.

Identify **one** way materials used for this construction project can be sustainably sourced.

Answer:

[1]

8c. Off-site factory production of the component parts of buildings is a common characteristic of modern methods of construction.

State **one positive** impact **and one negative** impact of modern methods of construction on operating costs.

Positive impact:

[1]

Negative impact:

[1]

Total for Question = 2 marks

Questions continue on the following page

Question 9

9a. Identify **three** things a feasibility study could include.

Answer:

[3]

9b. State **three** benefits of creating a schedule of accommodation.

Answer:

[3]

9c. Explain **two** responsibilities of the **client** in a construction project.

Answer:

paper

[6]

Questions continue on the following page

Question 10

10. Look at the Resource Document.

The construction project could use a **combination** of glass, concrete, aluminium and steel materials.

Compare **one** advantage **and one** disadvantage of **each** material to the aesthetic appeal of the completed project.

Answer:

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[8]

Extra Writing Paper

Please use the page below if you require additional space for answers. Clearly indicate which question number and part you are answering.

Past paper

Extra Writing Paper

Please use the page below if you require additional space for answers. Clearly indicate which question number and part you are answering.

Past paper

This is the end of the assessment.

Question	Marks	Question	Marks
1a		5c	
1b		5d	
1c		6a	
2a		6b	
2b		6c	
2c		7a	
3a (i)		7b	
3a (ii)		7c	
3b		8a	
3c		8b (i)	
4a (i)		8b (ii)	
4a (ii)		8b (iii)	
4b		8c	
4c		9a	
4d		9b	
4e		9c	
5a		10	
5b			

Total	
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