

UNIVERSITY OF GREATER MANCHESTER
OFF CAMPUS DIVISION
WESTERN INTERNATIONAL COLLEGE, RAS AL
KHAIMAH
BENG (HONS) CIVIL ENGINEERING
SEMESTER ONE EXAMINATION 2025/2026
CONSTRUCTION MANAGEMENT AND DIGITAL
SKILLS
MODULE NO: CIE5014

Date: Saturday, 17th January 2026

Time: 10:00am – 12:00pm

INSTRUCTIONS TO CANDIDATES:

There are **FOUR (4)** questions in this paper.

Answer **ALL** questions.

All questions carry equal marks.

Marks for parts of questions are shown in brackets.

All work must be shown. A numerical solution to a question obtained by programming an electronic calculator will not be accepted.

This examination paper carries a total of 100 marks.

Pages 7 and 8 should be attached with the answer script.

University of Greater Manchester
Off Campus Division - Western International College – Ras Al Khaimah
BEng (Hons) Civil Engineering
Semester One Examination 2025/2026
Construction Management and Digital Skills
Module No: CIE5014

QUESTION 1

a) A multi-storey residential project is under construction in Dubai. The main contractors, consultants, and client representatives regularly exchange information regarding structural changes and material approvals. In this situation, it is the responsibility of the originator of the communication (the site engineer) to ensure that the message is received, understood, and acted upon correctly. Evaluate the different methods of communication that could be used in this type of project. Discuss their advantages, limitations, and appropriate use for design changes and site coordination among project stakeholders.

(15 marks)

b) From the above case, analyse the communication barriers that could arise in the project affecting coordination, decision-making, and overall project progress. Provide suitable examples and suggest practical measures to overcome such barriers in future projects to ensure clear, accurate, and reliable information flow.

(10 marks)

[TOTAL 25 MARKS]

Please turn the page

University of Greater Manchester
 Off Campus Division - Western International College – Ras Al Khaimah
 BEng (Hons) Civil Engineering
 Semester One Examination 2025/2026
 Construction Management and Digital Skills
 Module No: CIE5014

QUESTION 2

The municipality plans to replace a damaged box culvert on a local road and reopen the road quickly at the lowest total cost. Traffic diversion, utility relocation, culvert installation, and road reinstatement are included. The project plan includes a series of activities, and **Table 1** provides details of each activity's duration and direct costs under both normal and crashed conditions. Assume the indirect cost per day as 100.00 AED.

- a) Draw the network diagram, calculate the normal completion time, and determine the total normal cost of the project.
(4 marks)
- b) Crash the project systematically to find the optimal project duration and minimum project cost.
(15 marks)

Table 1 : Activities

Activity	Normal		Crash	
	Duration (Days)	Cost (AED)	Duration (Days)	Cost (AED)
1-2	4	1200	2	1500
1-3	7	3500	4	3650
2-4	6	4800	3	6000
3-4	5	2500	3	3300
4-5	4	4000	2	5200
5-6	3	2400	2	3000

- c) Explain the possible practical challenges a project manager might face when implementing crashing in real-life construction projects.
(6 marks)

[TOTAL 25 MARKS]

Please turn the page

University of Greater Manchester
Off Campus Division - Western International College – Ras Al Khaimah
BEng (Hons) Civil Engineering
Semester One Examination 2025/2026
Construction Management and Digital Skills
Module No: CIE5014

QUESTION 3

a) In a commercial construction project, several material deliveries were misplaced, and expensive items went missing due to poor record-keeping and a lack of supervision. The site had no proper system for tracking deliveries or monitoring the usage and quality of materials, and no one was assigned to oversee procurement or inspection activities. Based on this situation, describe the two main aspects of materials control and explain in detail how the effective implementation of each can improve site efficiency, ensure accountability, and reduce material losses.

(10 marks)

b) For a water-retaining structure project in Al-Dhahir, excavation is required for the construction of an underground water reservoir that will store treated water for a nearby residential community. The excavation is planned to a depth of 6 metres below ground level, with a base area measuring 20m X 45m. Since the soil at the site consists mainly of silty clay, the sides of the excavation are designed to be sloped at an angle of 45° to the horizontal to ensure slope stability. A dragline excavator fitted with a 1.8 m³ bucket has been selected for the operation. In these soil conditions, the equipment has an average working output of 165 m³ (loose volume) per hour and can be hired at an hourly rate of AED 260. The manpower requirement for this excavation operation, with hourly rates, is summarized in **Table 2.**

Question 3 continued over the page

University of Greater Manchester
Off Campus Division - Western International College – Ras Al Khaimah
BEng (Hons) Civil Engineering
Semester One Examination 2025/2026
Construction Management and Digital Skills
Module No: CIE5014

Question 3 continued

Based on this information, determine the total cost of the excavation, including both equipment and labour, and show all necessary calculations clearly.

Table 2: Manpower requirements

Manpower	Hourly Rates
Dragline Operator	AED 43.50
Mechanic Fitter	AED 34.00
Banksman	AED 30.50
Labourer	AED 32.00

(15 marks)**[TOTAL 25 MARKS]****Please turn the page**

University of Greater Manchester
 Off Campus Division - Western International College – Ras Al Khaimah
 BEng (Hons) Civil Engineering
 Semester One Examination 2025/2026
 Construction Management and Digital Skills
 Module No: CIE5014

QUESTION 4

Table 3 details the sequence of activities for constructing 20 units for a Pier. The optimum gang sizes and total man-hours per activity for each unit are extracted from the contractor's method of statement.

The contractor operates from Monday to Friday, eight hours per day, and the target rate of completed construction is 4 units per week. A minimum 3-day buffer time is considered appropriate for this project, and it is assumed that all operations are sequential.

Table 3: Sequence of Activities for Pier Construction

Activity	Man-hours per activity (per unit)	Optimum gang size per activity (per unit)
A - Piling	420	4
B - In-situ Beams	560	5
C - In-situ Deck	760	6
D - Install Pipework	340	3

- a) Complete the Line of Balance **CALCULATION SHEET** provided on **Pages 7 and 8** for activities A to D, showing all working.

(15 marks)

- b) Using the data calculated, develop a fully annotated **Line of Balance schedule** on the graph paper provided (landscape orientation). Clearly state the minimum completion time for the entire project.

(10 marks)

[TOTAL 25 MARKS]

END OF QUESTIONS

PLEASE TURN THE PAGE FOR CALCULATION SHEET

University of Bolton
 Off Campus Division - Western International College
 BEng (Hons) Civil Engineering
 Semester One Examination 2025/2026
 Construction Management and Digital Skills
 Module No: CIE5014

CALCULATION SHEET- ATTACH ALONG WITH ANSWER SHEET

LINE OF BALANCE CALCULATION SHEET

PROJECT:

(Minimum Buffer Time Selected: days) Prepared by: Date:

Activity	Man Hours per Unit	Hand over rate/week	Total Man Hours/week	Number of Men				Actual Rate of Construction	Duration for one unit	Actual duration of work	Calculation of Start and Finish Dates	Summary					
				Planned / 40	Optimum gang Size	No of Gangs to be used	Actual No of Men used					First Unit		Last Unit			
												Start	Finish	Start	Finish		

Calculation sheet continued over the page

