

UNIVERSITY OF BOLTON
SCHOOL OF ENGINEERING
BENG (HONS) CIVIL ENGINEERING
SEMESTER ONE EXAMINATIONS 2021/2022
CONSTRUCTION MANAGEMENT
MODULE NO: CIE5002

Date: Tuesday 11th January 2022

Time: 10:00 – 13:00

INSTRUCTIONS TO CANDIDATES:

This exam paper contains TWO sections: section 'A' and section 'B'

Section A contains TWO questions: you must answer these TWO questions. They are worth 50 marks.

Section B contains THREE questions: you should answer any TWO questions from these three questions. Each of these questions is worth 25 marks.

Marks for parts of questions are shown in brackets.

This assessment carries 100 marks.

All working must be shown.

CANDIDATES REQUIRE:

Formula Sheets (attached following questions).

School of Engineering
 BEng (Hons) Civil Engineering
 Semester One Examination 2021//2022
 Construction Management
 Module No: CIE5002

Section A – Compulsory Questions (Answer BOTH Questions in this section)

Question One

Table Q1 contains 13 construction activities and their duration (in **weeks**) in a project, as well as the immediate predecessor (IPA) for each activity.

Activity	Duration (weeks)	IPA
A	4	—
B	10	A
C	2	A
D	6	C
E	15	B, D
F	4	B, D
G	3	F
H	2	B, D
I	1	E, G, F
J	3	I
K	2	E
L	1	J
M	2	K, L

Table Q1

Complete the following tasks:

- Draw a network diagram for the above activities using Arrow Diagram method.
(7 marks)
- Carry out the CPM calculation and determine the network critical path and the project duration.
(7 marks)
- Calculate the Total Float (TF) and Free Float (FF) for all non-critical activities.
(6 marks)
- What would be the effect of delay in activity K by 3 days on the network critical path and the overall project duration?
(5 marks)

[Total 25 marks]

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Question Two

The activities involved in the construction of a road project are given in **Table Q2.1** together with their estimated durations, logical sequence and cost. Each of the

activities will be done using a separate gang. At the start of day 13 the project, the actual work status report is shown in **Table Q2.2**.

Activity	Predecessor	Duration (Day)	Cost/Day (£/Day)	Total Cost (£)
A	-	6	400	2400
B	-	2	450	900
C	A	8	550	4400
D	A, B	5	350	1750
E	B	3	500	1500
F	D, E	6	400	2400
G	C, D	5	500	2500
H	F, G	2	475	950

Table Q2.1

Table Q2.2

Activity	Actual % Complete	Actual Cost (£)
A	100	2500
B	100	1250
C	35	2250
D	75	1625
E	100	1688
F	0	0
G	0	0
H	0	0

For this project, complete the following tasks:

- (a) Draw the project network using a Precedence Diagram and determine the project critical path and duration.

- (b) Produce the project Gantt Chart (5 marks)
- (5 marks)
- (c) Using the Earned Value Management (EVM) technique, check whether the project is on track cost wise and schedule wise. (15 marks)

[Total 25 marks]

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Section B – Answer Any TWO Questions

Question Three

Site organisation is a management function concerned with ensuring that the resources are ready in order that construction work may proceed according to the project programme. It embodies thought, which should be applied to the layout of the contractor's temporary facilities in addition to assembling and utilising the various resources.

Identify and analyse the various factors to be considered when addressing the issues of planning for temporary facilities and construction resources.

[Total 25 marks]

Question Four

Health and Safety (H & S) is one of the key objectives of any construction project. There are legal and commercial reasons why H & S should be a priority for all construction organisations. It can affect, and be affected by all the other project objectives.

Within this context answer the following:

- (a) Discuss when should H & S management should start in a construction project and give two examples of that. (5 marks)
- (b) Briefly discuss the regulations govern H & S in the UK Construction Industry. (5 marks)
- (c) Give two examples of how to include H & S in our design and planning. (5 marks)

(d) Discuss the ways by which we can control H & S in a construction site.
(5 marks)

(e) Explain why accidents still happen at construction sites despite all these legislations and the efforts of construction managers.
(5 marks)

[Total 25 marks]

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Question Five

The losses arising from poor materials management are probably the largest single contributor to the loss of money within any construction company. On many construction projects the materials content (inclusive of the cost of unloading, storing & transporting them around the site), can add up to well over half the contract value.

(a) Explain any four common causes of materials wastage associated with construction projects.
(8 marks)

(b) Describe how the following processes may improve the control of materials wastage and thus reduce the amount of money lost on a project:-

- (i) Accurate requisitioning (6 marks)
- (ii) Quality control (6 marks)
- (iii) Storage of materials (5 marks)

[Total 25 marks]

END OF QUESTIONS

FORMULA SHEET ON NEXT PAGE....

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Useful Formulae

EVM Terms and Equations

EVM Term		Definition	Formula
Planned Value*	PV	The budgeted cost for the work scheduled.	
Earned Value*	EV	The budgeted cost for the work actually completed.	
Actual Cost*	AC	The actual cost of the work actually completed.	
Schedule Variance	SV	The measure of schedule performance on a project.	$SV = EV - PV$
Cost Variance	CV	The measure of cost performance on a project.	$CV = EV - AC$
Schedule Performance Index	SPI	The measure of progress achieved compared to progress planned.	$SPI = EV / PV$
Cost Performance Index	CPI	The measure of the value of work completed compared to the actual cost or progress.	$CPI = EV / AC$

END OF PAPER