

UNIVERSITY OF BOLTON

SCHOOL OF ENGINEERING
BENG (HONS) CIVIL ENGINEERING

SEMESTER ONE EXAMINATION 2019/2020

CONSTRUCTION MANAGEMENT

MODULE NO: CIE5002

Date: Tuesday 14th January 2020

Time: 10:00am – 1:00pm

INSTRUCTIONS TO CANDIDATES:

This 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 one of these questions is worth 25 marks.

Marks for parts of questions are shown in brackets.

This examination paper carries a total of 100 marks.

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

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Section A – Compulsory Questions

Question One

A construction project is detailed below.

Activity	Predecessor	Activity duration in days
B	-	2
C	-	6
D	B	3
E	B	3
F	C	5
G	C	5
H	D	10
I	E	8
J	H	8
K	G	4
L	F, K	3
M	I, J	2
N	M	2
A	L, N	2

Complete the following tasks:

- Draw network diagram using Arrow Diagram and insert activity node numbers.
(7 marks)
- Carry out forward and backward passes to determine earliest & latest start times and earliest & latest finish times for each activity and the network critical path.
(8 marks)
- Calculate the Total Float (TF) and Free Float (FF) for all non-critical activities
(6 marks)
- If the construction manager discovered that duration of activity, G should be 10 days instead of 5 days and that of activity K should be 9 days instead of 4 days. Explain how this would affect the network critical path and the total duration of the project.
(4 marks)

[Total 25 marks]

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Question Two

The activities involved in 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 end of day 13 from start of the project, the actual work status report is shown in **Table Q2.2**.

For this project, complete the following tasks:

- Draw the project network using Precedence Diagram and determine the project critical path and duration. **(7 marks)**
- Produce the project Gantt Chart using the supplied graph paper **(5 marks)**
- Using the earned value management (EVM) technique, check whether the project is on track cost wise and schedule wise. **(13 marks)**

[Total 25 marks]

Activity	Predecessors	Duration (Day)	Cost/Day (£)	Total Cost (£)
A	-	7	300	2100
B	-	9	350	3150
C	A	8	450	3600
D	B	11	250	2750
E	C,D	4	400	1600
F	B	9	300	2700
G	F	7	400	2800
H	E,G	7	375	2625

Table Q2.1

Activity	Actual % Complete	Actual Cost (£)
A	100	2400
B	100	3000
C	50	2000
D	25	1000
E	30	500
F	0	0
G	0	0
H	0	0

Table Q2.2

END OF SECTION A PLEASE TURN THE PAGE FOR SECTION B.....

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Section B – Answer ANY TWO questions

Question Three

- (a) It is the responsibility of the originator of the communication in construction projects to ensure that the message has been received, understood and acted upon. Identify and plan the various points that should be carefully considered in order to achieve this.
(7 marks)
- (b) Evaluate the methods of communication employed in the construction industry.
(9 marks)
- (c) Analyse barriers to communication, providing appropriate examples and discuss how they may be overcome.
(9 marks)
[Total 25 marks]

Question Four

The Construction (Design and Management) Regulations 2015 came into effect in April 2015, establish the duties and responsibilities of the various parties to a construction project with regard to the overall management of health and safety in construction.

- (a) Discuss the contents of the two main documents to be produced under CDM2015 and who is responsible for producing each.
(10 marks)
- (b) Explain and discuss the main roles of:
- (i) The principal designer
(5 marks)
- (ii) The principal contractor
(5 marks)
- (iii) The workers
(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

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Useful EVM Terms and Formulae

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 FORMULA SHEET

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