

**UNIVERSITY OF BOLTON**  
**SCHOOL OF ENGINEERING**  
**BENG (HONS) CIVIL ENGINEERING**  
**SEMESTER ONE EXAMINATION 2018/2019**  
**CONSTRUCTION MANAGEMENT**  
**MODULE NO: CIE5002**

Date: Tuesday 15<sup>th</sup> January 2019

Time: 10:00 – 13:00

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**INSTRUCTIONS TO CANDIDATES:**

This paper contains two sections: section 'A' and section 'B'

Section A contains ONE question: you **MUST** answer this question. It is worth 28 marks.

Section B contains FOUR questions: you should answer ANY THREE questions from these four questions. Each of these questions is worth 24 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 Question**

**Question One**

**Table Q1** contains construction activities, their duration and dependency in a project.

Activity	Duration (days)	Predecessor
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, H
J	3	I
K	2	E
L	1	J
M	2	K, L

**Table Q1**

**Question 1 continues over the page....**

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**Question 1 continued....**

Complete the following tasks:

- (a) Draw a network diagram for the above activities using Arrow Diagram method.  
**(10 marks)**
- (b) 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.  
**(10 marks)**
- (c) Calculate the Total Float (TF) and Free Float (FF) for all non-critical activities.  
**(6 marks)**
- (d) What would be the effect of delay in activity K by 3 days on the network critical path and the overall project duration?  
**(2 marks)**

**Total 28 marks**

**Section B – Answer ANY THREE questions**

**Question Two**

It has been estimated that the construction industry could save hundreds of millions of pounds each year by utilising better waste management techniques. Reducing site wastage and exploring the potential for recycling are being more seriously investigated by the industry's contractors.

- (a) Describe briefly any six common causes of materials waste on construction sites.  
**(6 marks)**
- (b) Outline how designers may contribute to the reduction of materials waste on site in general.  
**(5 marks)**
- (c) Although the requirement to have Site Waste Management Plans (SWMPs) was repealed in 2013, they can still be used voluntarily to provide a structure for waste delivery and disposal at all stages during a construction project. Explain the preferred waste hierarchy prior to disposal of site waste and discuss how contractors may benefit from preparing and using a SWMP.  
**(13 marks)**

**Total 24 marks**

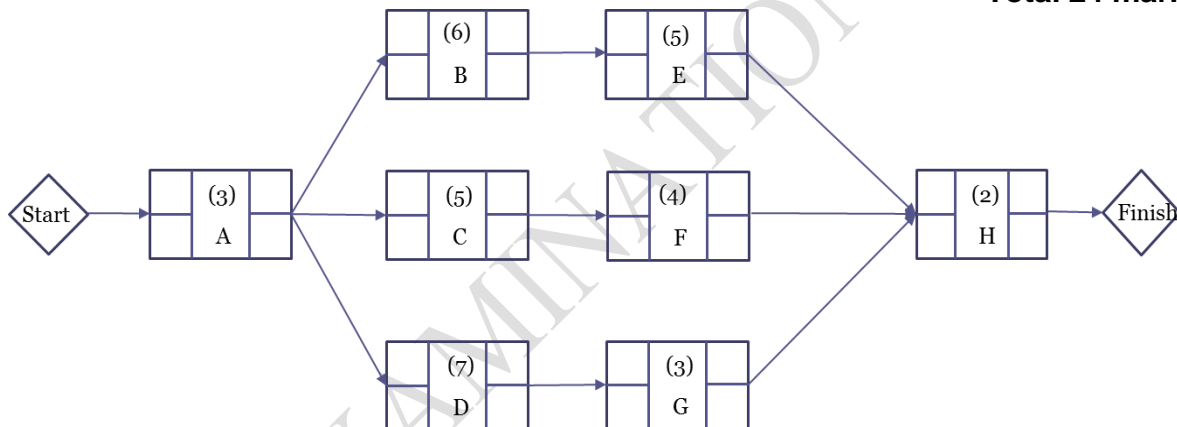
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### Question Three

The network diagram in **Figure Q3** below represents a planning programme for construction activities in a project. The durations and direct costs for the activities in the network under both normal and crash conditions are in the following **Table Q3**.

- (a) Analyse the network and determine the network critical path and project duration.  
**(10 marks)**
- (b) If the indirect cost for the project amounts to £100 per week and the client requested the project to be completed in **12 weeks**. Demonstrate how the contractor could achieve this and determine the **project total cost** when the contractor meets the client request.  
**(14 marks)**

**Total 24 marks**



**Figure Q3**

Activity	Normal		Crash	
	Duration (Weeks)	Cost £	Duration (Weeks)	Cost £
A	3	175	2	235
B	6	300	4	500
C	5	450	4	600
D	7	150	6	230
E	5	250	3	350
F	4	600	4	600
G	3	100	2	115
H	2	72	1	142

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**Table Q3**

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**Question Four**

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 24 marks**

**Question Five**

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 of producing each. **(9 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 24 marks**

**END OF QUESTION**

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PAST EXAMINATION PAPER