

UNIVERSITY OF BOLTON
**SCHOOL OF THE BUILT ENVIRONMENT &
ENGINEERING – RAK CAMPUS**
BSc(HONS) CIVIL ENGINEERING
SEMESTER TWO EXAMINATION 2010/2011
CONSTRUCTION MANAGEMENT
MODULE NO: BLT2007

Date: Thursday 2 June 2011

Time: 5.00 pm – 8.00 pm

INSTRUCTIONS TO CANDIDATES:

There are SIX questions.

Answer ANY FOUR questions.

All questions carry equal marks.

This examination paper carries a total of 100 marks.

Marks for parts of questions are shown in brackets.

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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Q1

It is the responsibility of the originator of the communication to ensure that the message has been received, understood and acted upon.

Carefully consider the following communication scenarios that would arise as part of the development of a construction project on site:

- (i) Health & Safety Site Induction
- (ii) Administration of a Contractual Claim

- (a) Suggest the most appropriate “primary” form of communication in each case, together with any “secondary” supporting form of communication if you believe it to be necessary and identify the significant components of each scenario, i.e. outline what may be involved or utilised in the effective communication of each process.

(12 marks)

- (b) Justify your selection of communication methods by discussing the advantages and probable limitations of those methods selected.

(13 marks)

Total 25 marks

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Q2

(a) Define the main objective of Time / Cost optimisation when associated with network analysis techniques and state how it may be achieved. (4 marks)

(b) **Table Q2** below defines the outline network programme prepared by a contractor involved in the construction of a small office block. The client wishes to know how the cost of the project would be influenced by a variation of the overall project duration, (stated in the tender documents as 49 weeks).

The client requires the work to be completed in 44 weeks, although he is apprehensive of the additional cost that he will incur in shortening the project duration.

ACTIVITY Format (i - j)	NORMAL		CRASH	
	Duration (Weeks)	Cost (£)	Duration (Weeks)	Cost (£)
1-2	5	300	3	600
2-3	10	275	10	275
2-4	14	500	13	610
3-5	12	600	8	1200
4-6	7	120	6	240
4-7	4	200	3	290
5-10	16	500	10	980
6-8	10	600	6	840
7-9	12	520	10	800
8-10	9	600	7	800
9-10	6	485	6	485
10-11	4	150	3	200

Table Q2

I. Using the **normal** durations from the table, prepare an arrow network that accurately represents the project. Indicate the critical path. (8 marks)

Question 2 continued over the page...

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Question 2 continued

- II. Determine the optimised **direct** cost of carrying out the project from the specified 49 weeks to the preferred 44 weeks.

(9 marks)

- III. Determine the optimum contract duration when overheads & other indirect costs totalling £165 per week are taken into account. State the associated project cost.

(4 marks)

Total 25 marks

Q3

- (a) A construction company is considering becoming a registered firm of assessed capability within a quality assurance scheme. Advise what this would entail.

(13 marks)

- (b) Concern has been expressed that quality assurance involves excessive paperwork and too much formality, which together serve to increase overhead costs and reduce the flexibility of operations on site, to an extent which can cause delay. This concern is probably justified in two circumstances but in each case actions can be taken to minimise, and in time, eliminate the problem. Identify the circumstances and discuss the appropriate actions that may be taken.

(12 marks)

Total 25 marks

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Q4

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.

- (a) Using the information provided in **Table Q4** together with the construction site scenario plan **Fig Q4** (both attached), develop an appropriate contractor's site layout. Annotate the plan with brief rationale justifying the particular location of the temporary facilities.

(13 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 | (4 marks) |
| (ii) | Quality Control | (4 marks) |
| (iii) | Storage of materials | (4 marks) |

Total 25 marks

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Q5 A tender has been prepared for the construction of a long sea-outfall pipeline. The total estimated value (excluding the cost of providing the necessary working capital) is £1,055,544 and the contract duration is 40 weeks.

The budget has been prepared (**Table Q5** attached), based on the anticipated programme of work. The contract documents provide for the contractor to be paid at intervals of 4 weeks and the delay in meeting each cost commitment will also be 4 weeks.

Retention for the project is 3%, half of which is to be returned at completion of the contract and the remainder following a period of correction of defects. The contractor has allowed for a profit margin of 18% in the budget and has determined that the cost of providing working capital is 17.4%.

- (a) Complete **Table Q5** provided, providing appropriate **Cost** and **Income** figures for each contract interval. (5 marks)
- (b) Plot and fully label the **Cost-Time (delayed)** and **Income-Time** graphs on the graph paper provided. [Vertical axis (£) @ 1 small square = £10,000 and Horizontal axis (Time) @ 2 small squares = 1 week]. (10 marks)
- (c) Determine the contractor's **total cost of borrowing capital** in order to finance the first half of the contract duration. (10 marks)

Total 25 marks

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Q6 The Construction (Design & Management Regulations [2007] – CDM₂₀₀₇ – came into force on the 1st April 2007, replacing both the Construction (Design & Management) Regulations 1994 (CDM94) and the Construction (Health, Safety & Welfare) Regulations 1996 (CHSW).

(a) Outline the key aim and objectives of CDM₂₀₀₇. (5 marks)

(b) Under Regulation 10 of CDM₂₀₀₇, the Client must provide designers and contractors with Pre-construction information i.e. project specific health & safety details needed to identify hazards and risks associated with the design and construction work.

Section 3 of the Pre-construction information relates to “Environmental restrictions and existing on-site risks” and contains information regarding both safety hazards and health hazards – Briefly outline any five appropriate hazards under each category.

(10 marks)

(c) The manager of a successful bricklaying contractor, with help from worker representatives, carried out a general risk assessment that covered their typical work. This assessment would be used when tendering for contracts to demonstrate the company’s approach to health and safety.

The company then recently secured a bricklaying contract for a development of three-storey apartments. The company manager checked the construction phase plan and met the principal contractor’s site manager on the site. This extra information was necessary to amend / supplement the general assessment so that it would also be specific to the work and conditions.

Given the above scenario, prepare a risk assessment to incorporate both the generic and site specific issues to be considered, detailing both the major hazards and risks emanating from the hazards.

(10 marks)

Total 25 marks

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Table Q4

Temporary Site Facility	Plan Dimensions (mm)
Site Offices (Contractor / Engineer Staff)	20 X 18
Toilets (Contractor / Engineer Staff)	13 X 9
Visitors Car Park (Contractor / Engineer Staff)	20 X 18
Site Offices & Drying Rooms (Site Staff)	33 X 14
Toilets (Site Staff)	10 X 14
Car Park (Site Staff)	50 X 40
Security	13 X 9
Fenced General Storage Compound	57 X 33
Tower Crane (90mm radius)	6 X 6
Steel Bending / Fabrication Area	30 X 8
Reinforcement Storage	30 X 8
Formwork Assembly	30 X 8
Timber Storage	30 X 11
Scaffold Storage	42 X 6
Cement Store	10 X 8
Fine Aggregate Store	6 X 8
Coarse Aggregate Store	6 X 8
Mixer (for Concrete)	5 X 6

END OF QUESTIONS

Table Q5

Student ID.....

Contract Week Nos	Interim Valuation (£)	Cumulative Valuation	Cumulative Cost (£)	Cumulative Income (£)
0-4	66716			
4-8	62025			
8-12	122613			
12-16	93921			
16-20	86459			
20-24	108697			
24-28	69757			
28-32	168407			
32-36	175769			
36-40	101180			

Calculations :-