RUBRIC

- This exam paper consists of THREE questions.
- Candidates should attempt ALL THREE questions.
- Question 1 is worth 40 marks
- Questions 2 and 3 are worth 30 marks each
- Total marks available = 100
- Total time available = 2 Hours

Question 1

You are planning the construction of a small extension to the Edinburgh airport terminal. Table Q1 below lists the main construction activities with their durations and required resources. The resources are defined as follows:

- CC = Concrete Crew;
- EWC = External Wall Crew;
- C = Crane;
- FC = Finishings Crew.

Table Q1

WBS ID	ID	Description	Duration (weeks)	Resource Requirement	Predec.
1		*Substructure*			
1.1	A	Foundations	3	1 CC	-
2		*Structure*			
2.1		*Floor 0*			
2.1.1	B	Slab	2	1 CC + 1C	A
2.1.2	C	Columns	2	1 CC + 1C	B
2.2		*Floor 1*			
2.2.1	D	Slab	2	1 CC + 1C	C
2.2.2	E	Columns	2	1 CC + 1C	D
2.3		*Floor 2*			
2.3.1	F	Slab	2	1 CC + 1C	E
2.3.2	G	Columns	2	1 CC + 1C	F
2.4		*Roof*			
2.4.1	H	Slab	2	1 CC + 1C	G
3		*Precast Stairs*			
3.1	I	Floor 0-1	1	1 CC + 1C	D
3.2	J	Floor 1-2	1	1 CC + 1C	F, I
3.3	K	Floor 2-roof	1	1 CC + 1C	H, J
4		*External Walls*			
4.1	L	Floor 0-1	2	1 EWC	D
4.2	M	Floor 1-2	2	1 EWC	F, L
4.3	N	Floor 2-3	2	1 EWC	H, M
5		*Finishings*			
5.1	O	Floor 0	5	1 FC	I, L
5.2	P	Floor 1	5	1 FC	J, M, O
5.3	Q	Floor 2	5	1 FC	K, N, P

Question 1 Continues on next page

Question 1 continued…

a) Using the worksheet in Attachment 1 (end of paper), develop the Network Precedence Diagram for this project programme, and highlight the Critical Path.

[Ensure your network diagram is neat, clear and well presented. Ensure you have detached the worksheet, *completed your exam number*, and enclosed *inside* your answerbook] **(18)**

b) Using the template in Attachment 2 and your Network Precedence Diagram, develop the Gantt chart corresponding to the early-start project programme, and highlight the Critical Path. Disregard resource availability issues. Note that the Gantt chart has been initiated with the first two activities (*Foundations* and *Slab – Floor 0*) to clarify expectations in presentation.

[Ensure your Gantt chart is neat, clear and well presented. Ensure you have detached the sheet, completed your exam number, and enclosed inside your answerbook.] **(8)**

c) You have now identified the initial resource availabilities to be: 1 CC; 1 C; 1 EWC; and 1 FC.

With the Gantt chart that you have already drawn, use the bottom four rows of the template ("Resource Req.") to establish the weekly resource requirements.

Then, identify any issue(s), and propose the best way to alter your initial programme in the following two distinct contexts:

i. Resource availability cannot be altered. **(7)**
ii. The completion date of the project cannot be delayed. **(7)**

Question 2

a) An Engineering Life Cycle typically has ten stages. While an individual project may have variants in these ten stages, they will all commence with the same initial stage.

Identify this initial stage and, using appropriate examples where possible, discuss why this stage is so important. In your answer ensure you cover *at least* the following points:

i. Who the project party responsible for this stage is.
ii. What the consequences of getting this stage wrong are.
iii. What the impact of stakeholders may be. (Note – a stakeholder is any person or organisation who is either affected by or has an effect on a project.) **(10)**

Marks are given depending on the depth and relevance of your answer, as well as the usefulness of your examples in demonstrating your understanding of this concept.

b) Consider the situation of the construction of a shopping centre on the outskirts of a medium sized city.

i. From the perspective of the project owner, when, in your opinion, is this project complete? Ensure you discuss the full reasons why you consider this to be the case. **(4)**
ii. From the perspective of the contractor, when, in your opinion, is this project complete? Ensure you discuss the full reasons why you consider this to be the case. **(4)**

c) Consider the situation of the development of an experimental nuclear research facility in Southern France.

i. When, in your opinion, would this project be complete? As previously, ensure you discuss the full reasons why you consider this to be the case. **(4)**
ii. What considerations would you suggest need to be made at this project's planning stage? **(4)**
iii. What might the consequences be if these considerations are not made? **(4)**

Question 3 Throughout this question use, if possible, real-world examples to support your answers.

a) Contracts between a promoter and a contractor are often classified by the method of payment and payment can be based either on *prices* (which are submitted by or agreed with the contractor as what he will be paid) or on the actual *costs* that the contractor incurs.

For each of the following two methods ***first*** describe how the payment mechanism operates, and ***then*** provide a commentary on how the financial risk that the method may create is distributed and mitigated across the project parties:

i. Measure and Value
ii. Target cost **(10)**

b) The *Cost Reimbursement* method of payment is a further way in which a contractor might be paid.

i. Describe how the payment mechanism operates **(4)**
ii. Discuss fully what the disadvantages this method of payment has to the promoter. **(4)**
iii. In spite of these disadvantages, what are the benefits of such a type of contract? **(4)**

c) The *MacLeamy Curve* (though it has also been posed and explained by other authors) describes the designer's varying level of influence on project cost along a project life cycle.

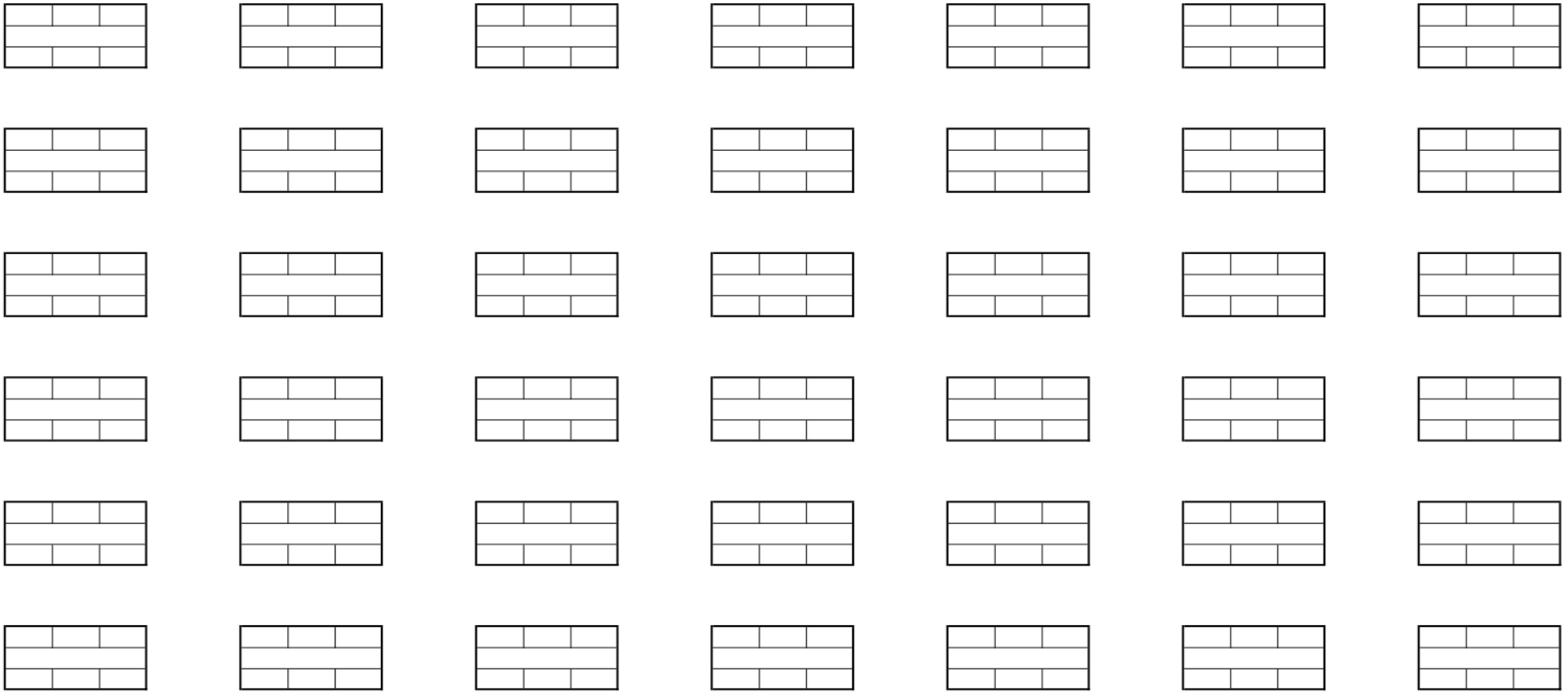
i. Provide a generic example of a MacLeamy curve. **(2)**
ii. Explain the nature of this curve, why does it take the form it does? What does the MacLeamy curve tell us about the responsibilities of a promoter during a project's development? **(6)**

ATTACHMENTS ON FOLLOWING PAGES

Attachment 1: Network Precedence Diagram worksheet (Question 1a)

DETACH AND INCLUDE WITH YOUR ANSWER BOOK

Exam Number:_____



Attachment 2: Gantt chart template (Question 1b)

DETACH AND INCLUDE WITH YOUR ANSWER BOOK **Exam Number__________________**

Activity		Calendar Week																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A	Foundations																														
B	Slab - Floor 0																														

	Resource Requirements	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30