

**UNIVERSITY COLLEGE LONDON**

University of London

**EXAMINATION FOR INTERNAL STUDENTS**

For The Following Qualifications:-

*B.Eng. Coll Dip M.Eng.*

**Chemical Eng E837: Project Appraisal**

COURSE CODE : **CENGE837**

UNIT VALUE : **0.50**

DATE : **17-MAY-04**

TIME : **10.00**

TIME ALLOWED : **3 Hours**

*Answer ALL FOUR QUESTIONS, but note that Q.3 offers a choice.  
Each question carries marks as follows: Q.1 = 15, Q.2 = 40, Q.3 = 20, and Q.4 = 25,  
subdivided as shown [ ].*

1.

- a) How is the Total Capital Employed (TCE) used in financial appraisals and comparisons? [5]
- b) You are investigating the viability of a large project that will be built over a period of 3 years. Using the information contained in the first of the accompanying data sheets, calculate the total capital employed in the project as it starts to operate. [10]

2.

- a) The Internal Rate of Return is a very precise measure of the financial viability of a potential project. How would you expect it to relate to the riskiness of a project? [3]
- b) Your company has two potential projects in view, with the same total investment, but with very different patterns of annual cash flow. Using the information in the second of the accompanying data sheets, make and justify a recommendation to the Board as to which one is the more attractive as an investment, given that the company's current Hurdle Rate of Return is 20%. Your recommendation should cover as many aspects of the investment as you consider relevant. [30]
- c) What amount of net cash flow, added to the revenues of the less attractive project, in equal instalments in each of the last four years of the plant's financial life, would give it the same NPV at the Hurdle Rate of Return as that of the more attractive project? [7]

3.

**EITHER** You are considering the construction of a large, self-contained project on the east coast of Scotland, that will be in operation by 2007. Review all of the sources of energy potentially available to you, both finite and renewable, giving the likely advantages and disadvantages relative to your site, and to the plant's likely lifetime. [20]

**OR** You are bringing a major new project to completion, which will make a product new to you, but not new to your market. Discuss all the factors that control the price that you will be able to charge for your product, describing how you will probably set that price, and outlining your market entry strategy. [20]

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4.

Your company is proposing to build a new plant with the following main characteristics:

- the production process occurs under moderate temperatures and pressures, with little noise, and no solid residues from the process itself;
- no potentially explosive mixtures are formed in the process;
- a toxic gas is evolved during production, which is destroyed by contact with weak acids;
- the product is an organic chemical;
- nitrogen compounds and phosphates are involved in the process;
- the local land and water courses are sensitive, and quite severe consent restrictions will be imposed on liquid effluents.

a) What items of current legislation in the UK affect the operation of the plant, in terms of safety and welfare on and off site, and of environmental impact?

[10]

b) All of the project's liquid effluents, together with all storm water, will be sewered together and taken to a liquid treatment plant within your plant boundary. List, and briefly describe, the components of that plant that will be necessary to achieve an acceptable final effluent for discharge into a nearby river.

[15]

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## Question 2

### DATA SHEET

For both projects:

2 years in construction, 10 years economic lifetime

Investment in either project

Fixed Capital Investment:

First year of construction	£32 millions
Second year of construction	£32 millions

FCI (only) covered by loan at 8% interest

Start-Up Costs	£ 4 millions
Working Capital	£11 millions

Net Cash Flows	Project A	Project B
Operating year 1	£ 3.50 millions	£31.50 millions
2	£ 7.00	£31.50
3	£10.50	£31.50
4	£21.00	£31.50
5	£28.00	£31.50
6	£42.00	£31.50
7	£52.50	£21.00
8	£52.50	£10.50
9	£52.50	£ 7.00
10	£63.50	£14.50

[NB restrict numerical amounts to £millions with no more than two places of decimals]

**END OF PAPER**