

ENGINEERING TRIPOS PART IIB
ELECTRICAL AND INFORMATION SCIENCES TRIPOS PART II
ENGINEERING TRIPOS PART IIA

Thursday 24 April 2003

9 to 10.30

Module 4D16

CONSTRUCTION AND MANAGEMENT

*Answer not more than **three** questions.*

All questions carry the same number of marks.

*The **approximate** percentage of marks allocated to each part of a question is indicated in the right margin.*

**You may not start to read the questions
printed on the subsequent pages of this
question paper until instructed that you may
do so by the Invigilator**

(TURN OVER

1 (a) Outline briefly the process of consideration and control of new development in England and Wales, and the hierarchy of plans and planning guidance. What strategy might the owner of a large tract of agricultural land in Cambridgeshire adopt to promote its development for housing and light industry? What input from engineering design firms, and what assessment of impact of the scheme, might be needed to secure planning permission? [50%]

(b) Describe briefly one example of the achieving of planning permission for a recent construction scheme, outlining how the scheme was altered, and what engineering input was required, to take account of views expressed in the consideration process. Discuss whether these changes improved the scheme. [50%]

2 Describe briefly the main stages of the design process for a major building project with a substantial engineering input. How might this process be managed to achieve the desired objectives, given that designers and engineers have to work within a restricted overall fee? What sorts of engineering calculation, and what methods of estimating cost, would normally be appropriate in the various stages? What steps might be taken to ensure that the building as designed is not unduly difficult or costly to construct?

Illustrate your answer by describing the evolution of the design of one major building project outside the Cambridge area, and discussing how well that evolution fitted the standardised staged design process you have outlined. [100%]

3 (a) Outline briefly the current routes and methods for procurement of major construction in Britain, and mention any recent developments in them. List the different forms of construction contract available, and briefly discuss the advantages and disadvantages of each. Illustrate your answer by describing the evolving contractual arrangements for the different phases of the Centre for Mathematical Sciences in Cambridge. Discuss whether different contractual arrangements might be desirable abroad, for example in Saudi Arabia. [85%]

(b) The client for a major building project wishes it to be completed as quickly as possible. It is suggested that some types of contract would permit design and construction to proceed in parallel. What procurement method(s) would permit this, and what are the possible pitfalls? [15%]

4 (a) Outline briefly the basic aims and major provisions of the Health and Safety at Work Act 1974 and the Construction (Design and Management) Regulations 1994 and 2001. In typical construction situations, who counts as a 'designer' under CDM Regulations, and what are a designer's responsibilities? Describe briefly the role of 'planning supervisor' under the Regulations. [50%]

(b) Describe briefly a typical simple risk-assessment form for a construction project. What hazards and risks would be included on such a form by different professionals at different stages of the project? What aspects of each risk are typically assessed, and how and on what scale(s)? Once such a form has been completed, what are the next steps in risk management for the typical project? [50%]

(TURN OVER

5 Answer any **two** of the following.

(a) Write brief notes on the requirement for assessment of environmental impact before a major new construction project can be approved. Concentrate particularly on the contribution engineers might make to the various assessments, and illustrate your answer by quoting examples. [50%]

(b) Discuss and explain the prevalence of sub-contracting in modern British construction. What different types of sub-contractor and sub-contract are there? How may their expertise be called upon at an early stage in the design process, and how may the work of the various sub-contractors be properly co-ordinated? Illustrate your answer by describing the input of one sub-contractor to the design of one major construction project. [50%]

(c) 'Risk management' plays a prominent role in the organisation of modern construction. Discuss this concept briefly, outlining with examples the various types of risk which are included and describing how construction may be managed in different ways so as to allocate and apportion the various risks differently to the various parties involved. [50%]

(d) Describe briefly two major types of insurance in use in the modern construction industry. Make clear the significant features of each type of policy, and who is being covered against what. Explain briefly why in a recent case a design firm was held liable to meet most of the costs of a fire, for causing which that firm was only marginally to blame. What steps might the firm have taken to insure against that outcome? [50%]

END OF PAPER