

ENGINEERING TRIPOS PART IIB
ENGINEERING TRIPOS PART IIA

Saturday 7 May 2005

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.

There are no attachments.

**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) Explain why a major landowner wishing to develop rural land needs to think for the long term. What assessments of the impact of a proposed development scheme might be needed to secure planning permission, and how may a developer be made to reduce or mitigate that impact?

[40%]

(b) Give brief details of the gaining of approval for one particular recent building development, outlining the background to the proposal. What plans, costings and specifications had to be put forward at the various stages, what arguments and risk assessments were needed to convince those concerned, and what stipulations or restrictions were imposed by the authorities? Discuss briefly how this affected the design of the building(s).

[60%]

2 (a) Set out briefly the main stages of the design process for a typical UK building project with a substantial engineering input and a traditional procurement route. What professionals would be involved at each stage, and how should they reach decisions? What sorts of engineering calculation, and what methods of cost estimation, would normally be appropriate at each stage? Discuss briefly what steps might be taken to speed up construction by beginning some work on site before all design work is complete.

[50%]

(b) Outline briefly the main problems that had to be solved by the designers of **either** the Maritime Museum in Osaka **or** another building of your choice outside Cambridge. Describe the contributions of the architect and the different sorts of engineer to the concept of the building and the resolution of its design problems, and discuss whether the design process and cost estimating followed the standard pattern described for part (a) above.

[50%]

3 (a) Discuss briefly the question of 'design responsibility' in major construction work, and why it is important. Who has the main responsibility for design at the various stages of the work, under the main possible procurement routes? How may designers involved earlier on continue to be involved when the main contractor is 'brought in early', and what factors might a main contractor consider when deciding whether to become involved in a project in this way? Outline briefly what the Construction (Design and Management) Regulations 2000 have to say in this area. [60%]

(b) Discuss, illustrating your answer by referring to at least one recent project, the role of specialist sub-contractor in major construction work. How may their expertise best be harnessed in a project, and what is the most suitable procurement route if one or more specialist sub-contractors are to be involved? [40%]

4 (a) Outline briefly the basic aims and major provisions of the Health and Safety at Work Act 1974, concentrating particularly on how it affects the construction industry. [40%]

(b) Discuss briefly the various risks likely to arise during a construction project, and the relation between risk and value. How might risks be identified, assessed and managed? At what stage(s) and in what detail would risk assessments be carried out, and for what purposes? What steps might be taken to manage risks once they have been assessed? [60%]

5 *Answer any two of the following*

(a) Outline the main features of the requirements for assessment of environmental impact before a major new construction project can be approved. Discuss what role concepts of sustainability play in these assessments generally, and in particular the specification for a new building for Cambridge University.

[50%]

(b) Outline briefly the various main forms of procurement of major building projects in the United Kingdom, and the recent history of their development. Why might the favoured forms be different for construction in the private and public sectors? How might the costs of operating and maintaining a building be incorporated into the procurement process?

[50%]

(c) Under English law, what is the standard of care expected of a professional engaged in some aspect of construction work? Discuss whether there are procurement routes within which a professional may become subjected to a higher standard, should claims arise when things go wrong. What steps might a professional engineer take to ensure that s/he is not exposed to this higher level of liability?

[50%]

(d) Outline the main features of professional indemnity insurance for engineers in construction, explaining what is and what is not covered by a typical policy. Who should take out such insurance, and why, and for how long?

[50%]

END OF PAPER