

UNIVERSITY OF LONDON  
IMPERIAL COLLEGE OF SCIENCE, TECHNOLOGY AND MEDICINE

EXAMINATIONS 2003

BEng Honours Degree in Computing Part II  
MEng Honours Degrees in Computing Part II  
BSc Honours Degree in Mathematics and Computer Science Part II  
MSci Honours Degree in Mathematics and Computer Science Part II  
for Internal Students of the Imperial College of Science, Technology and Medicine

*This paper is also taken for the relevant examinations for the  
Associateship of the City and Guilds of London Institute  
This paper is also taken for the relevant examinations for the  
Associateship of the Royal College of Science*

PAPER C222=MC222

SOFTWARE ENGINEERING - DESIGN II

Monday 28 April 2003, 10:00  
Duration: 120 minutes

*Answer THREE questions*

Paper contains 4 questions  
Calculators required



- 1a Explain how, in its ten years of existence, use of the World Wide Web has changed from its original intended application. What shortcomings has this shown up in the Hypertext Transfer Protocol (HTTP) and how have they been addressed?
- b Hypertext Markup Language (HTML) forms are the standard way of allowing users to enter data via a web page. Explain how client-side scripting can be used for checking validity of input. What are the advantages of checking client-side? Suggest why some checking may have to be done server-side.
- c GET and POST are the HTTP methods for submitting data from an HTML form in a web page to a web server. Describe how the data is sent from the browser in each case and how it is passed by the web server to the server-side process. When might you choose to use each method?
- d A local restaurant has started taking orders via its website for delivery in the area. After all the required items from the menu have been selected and payment details entered, the customer can track the progress of the order through the stages of preparation up to delivery. Explain what is involved in providing such a facility. Outline the pseudo-code of a server-side process that would respond to such a query with the requested information.

*The four parts carry, respectively, 20%, 30%, 20%, 30% of the marks.*

- 2a In 1992 the US Navy conducted an evaluation study of two warfare tactical symbol sets. One aim of the study was to determine the effectiveness of the symbols in various overlap conditions, and the role of colour on target selection performance. In particular, data was collected on *timeouts*, which was when an operator took longer than two minutes to perform a task.

The table below shows the distribution of timeouts by *symbol set* (NATO, NTDS), *overlap condition* (none, partial, on top, complete), and *adjacent colour* (same, different). Without calculating the main effects, what conclusions can you draw?

**Timeouts by symbol overlap condition and adjacent symbol colour**

	none		partial		on top		complete	
	same	different	same	different	same	different	same	different
<i>symbol set</i>								
NATO	3	0	1	1	1	3	3	33
NTDS	1	0	0	1	0	0	0	4

- b You have been asked to design a usability evaluation study of a new mobile phone. The aim of the study is to assess whether the new phone is easier to use than the phones currently most popular in the market. Write a brief plan for a usability study which could assess this. Include discussion of:
  - i) the scope of the study,
  - ii) the way usability would be assessed
  - iii) the size and nature of the data to be collected, and
  - iv) any supplementary analysis.

*The two parts carry, respectively, 40%, and 60% of the marks*

- 3a Briefly explain what is meant by *gesture* in Human Computer dialogue, and describe the other components of dialogue.
- b Briefly explain what is meant by a *mode* in interaction, indicating which of the following introduce modes, and why, or why not.
- i) *the keyboard shift key,*
  - ii) *the CAPS lock key,*
  - iii) *traffic lights,*
  - iv) *an automatic exit gate at a London underground station,*
  - v) *the next command prompt in a computer command line interface*
- c What observable features of human cognition make modes seem undesirable? How are their undesired features mitigated. Illustrate your answer by explaining how each of the instances of a mode above has been, or could be mitigated.

*The three parts carry, respectively, 30%, 30%, and 40% of the marks*

- 4 Briefly describe what is meant by each the following design paradigms, using a diagram where relevant. Explain by example why the paradigm can be used in the design of software for Graphical User Interfaces:
- i) Publish and Subscribe ( or subscribe/notify)
  - ii) Model-View-Controller
  - iii) Component Inheritance
  - iv) Noun-Verb operation
  - v) Constraint-based specification

*The five subparts each carry 20% of the marks.*