A27229 *No calculator permitted in this examination*

UNIVERSITY OF BIRMINGHAM

School of Computer Science

Third year – Degree of BMusc with Honours
Music with Year in Computer Science

Third year – Degree of BSc with Honours
European, Political Social Economics with Year in Computer Science
Biological Sciences with Year in Computer Science

Third year – Degree of MSci with Honours
Physics with Astrophysics with Year in Computer Science
Mathematics with Year in Computer Science

Third Year – Degree of BEng with Honours
Electronic and Electrical with Year in Computer Science
Chemical Engineering with Year in Computer Science

Fourth Year – Degree of MEng with Honours
Chemical Engineering with Industrial Experience with Year in Computer Science

Degree of MSc
Computer Science

06 21936

Fundamentals: Software Engineering

Summer Examinations 2011

Time allowed: 1 ½ hours

[Part A: Answer ALL Questions
Part B: Answer TWO out of Three Questions]]

No calculator

Part A

Answer all questions from this section.

1. Which, in your opinion, is the greater driver of why software systems still fail to perform as desired – because programming languages have not improved or because systems are not tested adequately before deployment? Justify your answer briefly.

total **10%**

2. What is a non-functional attribute of a system? What non-functional requirements might be stated for a library indexing system aimed at borrowers and librarians?

total **10%**

3. Would you say that code is read more often than it is written or written more than it is read? Justify your answer with respect to the software life-cycle.

total **10%**

4. Distinguish carefully between white-box and black-box testing.

total **10%**

Part B

Answer any two questions from this section.

5. What is 'modularity' and why is it important? What makes a good module?

   Assuming for the moment that 'module' corresponds to method rather than 'class' in an object-oriented language, argue whether modules should be restricted to seven statements each (the number of facts the human brain can hold in short term memory at one time), referring back to your assessment above.

total **30%**

6. Describe and detail a software development process based on prototyping that is suitable for a very small software house with a team of 5 programmers, all of whom are excellent programmers, but with different specialities (GUI, databases, scientific programming, etc). Justify your answer fully.

total **30%**

7. Describe the following scenario either (a) as a data-flow diagram, or (b) using an entity-relation diagram, or (c) as a use case in UML notation. Justify your choice of notation in this instance.

   A standard insurance package is made available by ACME Car Hire and required for all their car hire customers regardless of their own personal insurance arrangements. The only requirement for a customer to hire a car is that they are 25 years old and in possession of a current full UK driving licence (or an international driving licence). ACME staff will take a photocopy of the license at the start of the car-hire period.

   Normally the customer pays for the car hire charges at the time of the return of the car. However, ACME Car Hire will only accept payment through a credit card in the name of the customer, and details of the credit card will be retained before the hire

starts so that later charges (for example, an excess charge in the case of an insurance claim following an accident) against the customer's credit card can be made. Hence the customer is required to supply their credit card details before proceeding with the hire.

The customer is given the keys of a car that has been prepared, cleaned and fuelled by the in-house mechanics, and will inspect it jointly with the staff member before signing off on the manifest, which the staff member will photocopy. Details of the hire – the customer's details, the car identifier, date, hour, etc. – are entered by the staff member on the ACME database in accord with the paperwork that just filled out, and the paperwork itself is filed.

total **30%**