

**Candidates are admitted to the examination room ten minutes before the start of the examination. On admission to the examination room, you are permitted to acquaint yourself with the instructions below and to read the question paper.**

**Do not write anything until the invigilator informs you that you may start the examination. You will be given five minutes at the end of the examination to complete the front of any answer books used.**

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**May/June 2013**

**SE3SQ11 2012/13 A 001**

**1 Answer Book**  
**Any calculator (including programmable calculator) permitted**

**UNIVERSITY OF READING**

**SOFTWARE QUALITY AND TESTING (SE3SQ11)**

**Two hours**

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**Answer any THREE out of FOUR questions.**

**EACH Question is worth 20 marks.**

1.
  - (a) Explain the difference between error, fault, failure and reliability. Provide concrete examples with your explanation. (6 marks)
  - (b) Explain why version control is important to testing and suggest which artefacts need to be controlled in a large-scale software development. (6 marks)
  - (c) You are the newly appointed quality manager of a company whose current state of operational maturity in regard to testing is at the capability maturity model (CMM) level 1. Your boss would like to see things improved. Write a letter explaining that it is desirable to aim for CMM level 2 and propose and justify FOUR investments the company should make in quality and testing infrastructure. Credit will be given for including a clarification the features of the TWO CMM levels in your answer. Mention any key assumptions you make. (8 marks)

2. (a) Explain the differences between a line of code, a statement and a code block. (4 marks)
- (b) Explain the differences between equivalence partitioning, boundary value analysis and state transition testing. Illustrate EACH of these in relation to the testing of a simple tax-band calculator application that is based on inputting an income and returning a tax-band. (Note: A tax-band is a range of earnings where a particular percentage of tax applies; e.g. earnings over £100,000 per year being taxed at 40%) (8 marks)
- (c) Consider the following specification of requirements:

<p>R1: "The patient shall be treated if they are male and at least 12 years of age and no older than 80 years of age".</p> <p>R2: "The patient shall be treated if they are female and younger than 60 years of age".</p> <p>R3: "The patient's age and gender shall be read from an electronic patient record on the treatment choice dialog".</p>
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Design a set of test cases to test the functional requirements in the case achieving 100% equivalence partition coverage. You may assume that the data entered by the user is always of the right type. Present your answer as an appropriately tabulated set of test cases. Credit will be given for explaining the assumptions and rationale behind your choice of test cases. (8 marks)

3. (a) Discuss the idea that there is “a ‘warranted behaviour’ of a software product that may need to be reverse engineered for testing purposes” and suggest how this may lead to the design of test cases. (6 marks)
- (b) Consider the ‘warranted behaviour’ of making a cash-withdrawal from an automatic teller machine (ATM – aka cash machine); assume that the only fault condition is user failure to enter a correct PIN and that only three attempts to correct it are allowed. Based on this understanding demonstrate how use cases can form the basis for designing sets of black box test cases. Credit will be given for showing test for success, failure and recovered scenarios. (14 marks)
4. (a) Explain what is meant by ‘regression testing’ and explain why in iterative incremental developments such as Scrum it can pose serious problems to the testing team. (8 marks)
- (b) Consider the case: “A company produces a software application to run on a PC. It is built from two components. One is a bought-in DLL and the other is a GUI and analysis component written by the company. The application when running accesses a provided ODBC database of very many medical records. Its function, controlled through user commands at the GUI is to perform various analyses of the data and provide graphical and tabular results to the GUI. The accuracy of the analysis functions is critical. “Make reasonable assumptions and design an automated test and reporting system for the GUI and analysis component. You may assume that the focus is on scheduling and executing tests and reporting them. Credit will be given for including UML deployment and component diagrams to represent your testing system. (12 marks)

(End of Question Paper)