

On admission to the examination room, you should acquaint yourself with the instructions below. You must listen carefully to all instructions given by the invigilators. You may read the question paper, but must 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.

May/June 2014

SE3SQ11 2013/14 A 001 & SE3SQ11 2012/13 A 201

1 Answer Book

Any calculator (including programmable calculator) permitted

UNIVERSITY OF READING

SOFTWARE QUALITY AND TESTING (SE3SQ11)

Two hours

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

EACH Question is 20 marks.

1. (a) Describe the range of artefacts that we may need to consider when managing the quality of a software development. Credit will be given for basing your answer on the UML architectural perspective, including a suitable diagram, and for considering the influence of management and evolution.
(10 marks)
- (b) You are the newly appointed quality manager of a software development company. In order to improve testing capability maturity your boss would like you to introduce a system of metrics to increase the quality of the evolution and maintenance of requirements specifications. Propose FOUR distinct metrics with a full Feature Criteria Metric (FCM) justification. Include any key assumptions you make.
(10 marks)

2. (a) Discuss the role of test cases in web page intensive products. Credit will be given for the quality of THREE significant and distinct observations. (6 marks)
- (b) Consider the following specification of a segment of source code:

```

1 Public Function StockAvailable(Q) As Boolean
2   Const NOSTOCKLEFT = -1 'Constant used to indicate
3     'out of stock condition
4   'Calculate a new residual stock assuming Q are removed
5   ResidualStock = ResidualStock - Q
6   'Apply stock availability rules
7   If ResidualStock < 0 Then 'Not enough stock
8     ResidualStock = NOSTOCKLEFT
9     StockAvailable = False
10  Else 'Enough Stock
11    StockAvailable = True
12  End If
13
14  'Test to see if Restocking will be needed
15  If ResidualStock < Minstock Then
16    RestockFlag = True
17  Else
18    RestockFlag = False
19  End If
20 End Function

```

Create a table showing blocks of code and then create a control flow graph showing the decisions and branches based on the blocks. Credit will be given for showing your working steps to create a control flow graph.

(7 marks)

- (c) Building on your answer to (b) define a single test case and estimate the percentage branch coverage achieved. For the purpose of your test case you may assume that ResidualStock has been set externally to 10 and MinStock has been set externally to 5. Credit will be given for showing your working steps to determine the extent of branch coverage.

(7 marks)

3. Consider a theatre club in which members are given a unique identity code that they can use to book shows on-line. Make reasonable assumptions and decide what you would consider to be the 'warranted behaviour' of a booking website for the club; you may assume that the only fault condition is the user supplying an incorrect identity code and that only three attempts to correct it are allowed. Consider how sets of test cases can be produced from a use case expressing the warranted behaviour and THEN answer the following questions:
- (a) Propose the key 'state' variables to be considered in designing sets of test cases. Credit will be given for naming them and for observations on how they might be set and inspected.
- (6 marks)
- (b) Propose a use case for the warranted behaviour and use it to specify tests for the three scenarios: success, failure and recovered. Credit will be given for including your key assumptions.
- (14 marks)

4. (a) Consider the obligation in the fundamental test process (FTP) to record test results. Explain why this may be valuable to a development enterprise and suggest the measures that must be taken for the results to have any practical value. (6 marks)
- (b) Imagine the following situation: “Your company produces a database protection application (DBGuard). It works by accepting SQL statements as text strings through a programming interface (In-API) and outputs them as text strings if they are safe (i.e. they pose no security threat) through a second interface (Out-API); if DBGuard determines that the input SQL is unsound it outputs the text string “BAD_SQL_Received”. Both of the interfaces may be used by external components through provided dynamic link libraries (DLL). The DBGuard component is installed as an ‘exe’ file along with the two dynamic libraries (DLLs); one each for the In-API and Out-API. Because SQL input strings can be complex it is expected that it will be necessary to produce frequent highly controlled upgrades of DBGuard. Hence acceptance and regression testing is a key success factor.”

Make reasonable assumptions and, based on these, design an automated test and reporting system for the DBGuard application. You may assume that the focus is on scheduling and executing tests and then reporting them. Credit will be given for including up to THREE reasonable and justified assumptions and then proposing a testing system including the expected business processes along with the test kit deployment and component diagrams to represent your testing system.

(14 marks)

(End of Question Paper)