Two hours - on line

The exam will be taken on line.
This is the paper format, which will be available as a backup
and to be handed out to students for reference immediately AFTER the examination starts

Please do NOT use the exam paper to write your answers

UNIVERSITY OF MANCHESTER
SCHOOL OF COMPUTER SCIENCE

Software Engineering Overview

Date: Wednesday 25th January 2012
Time: 14:00 - 16:00

Please answer exactly TWO questions from Section A and
ONE Question from Section B

This is a CLOSED book examination

The use of electronic calculators is NOT permitted
Section A

Answer TWO questions from this section

Question A1

a) Briefly explain the relationship between the Unified Process and Agile development. (2 marks)

b) Do Agile UP and Scrum project teams differ significantly in the way they interact with stakeholders? (2 marks)

c) State four different groups of stakeholders, other than students, in the MELT project, and what their principal concerns will be. (4 marks)

d) State two similarities, and two differences, between use cases (as used in the UP) and user stories (as used in Scrum) (4 marks)

e) The following is a possible version of the Take Test use case for MELT.

“The student types his/her username and password into a JDialog and presses the Start button to start the test. The student clicks on a radio button to indicate the correct answer for each question. A timer stops the test when the time is up.”

Give eight reasons why this is not a good use case description. Hint: there are some important omissions as well as other problems. (8 marks)
Question A2

a) How can UML diagrams be used to facilitate communication between software developers in an agile development team? Your answer should mention at least two different uses. (4 marks)

b) Explain, using an example from MELT, how a domain class diagram can be used to gather useful information from stakeholders. Your answer should take into account the different kinds of skills which different stakeholders have. (5 marks)

c) What is the fundamental relationship between a domain class diagram and a design class diagram? (1 mark)

d) State three things which are shown on design class diagrams which do not appear on domain class diagrams. (3 marks)

e) The Irwell Media Store started off as a bookstore, but later started selling CDs and DVDs too. More recently it has started selling laptops too, and it plans to branch out into other electronic devices such as phones and PDAs, although it does not intend to become a general store. The company is taking its first tentative steps into the online marketplace, and has commissioned you to produce a prototype inventory system.

Draw a domain class diagram which represents the kinds of products which the store currently sells, in a way which can be easily extended in the future. Hint: the standard solution has 7 classes of which 3 are abstract. (5 marks)

f) If you were modelling a general store with thousands of different kinds of products, how would the domain model have to be different? (2 marks.)
Question A3

a) Briefly explain the role of GRASP patterns in object-oriented software development. (3 marks)

b) Explain the GRASP principles of Polymorphism and Protected Variations, and how they are related, using examples from MELT. (6 marks)

c) Briefly explain the GRASP principle of Indirection, and how it relates to Polymorphism and Protected Variations. (3 marks)

d) In ABC we have a tool, implemented as a Java applet, which monitors exams in progress by accessing information from the server every few seconds. It contains a table with a row for each student, showing the status of the student, for instance how much time they have left, and when their work was last backed up. The invigilator has various display modes, such as showing only students currently working, or ordering the table based on any of the columns.

Explain the notion of a Controller, and the different types of controller, using the monitoring tool as an example. Suggest what sort of controller, if any, would be most appropriate here. (5 marks)

e) How might other GRASP patterns be applied in the design of the monitoring tool? (3 marks)
Section B

Answer ONE question from this section

Question B1

a) In Agile software development individuals and interactions are valued more than processes and tools. State three other key principles. (3 marks)

b) In agile approaches individuals and interactions are valued more than processes and tools. Explain how this principle is reflected in agile practices. (5 marks)

c) You are tasked with introduction of agile methods into a global fleet vehicle hire organisation that produces computer software for its internal needs. What arguments would you use to persuade senior and middle management that this is a good move for the organisation? (4 marks)

d) In the same situation as in part c, what additional arguments would you use to persuade technical managers and staff? (4 marks)

e) “Agile is more than just a development process, it is also an attitude or mindset for life in general.”

Explain this statement, and state whether you agree with it, and why. (4 marks)
Question B2

a) State four important activities which take place at specific times in a typical Scrum sprint. (4 marks)

b) State three important ways in which tools enable an agile process. (3 marks)

c) Explain the notion of velocity in agile processes and state two different ways in which measuring velocity can help to maximise the amount of useful work during a sprint. (3 marks)

d) Draw a burndown chart for a Scrum team which has underestimated its velocity half way through a sprint. (4 marks)

e) What action should the team take in the situation in part d? (2 marks)

f) The networking infrastructure in your office is causing problems, although there is some disagreement within the team as to how serious the issue is. How would you go about resolving this in a retrospective? (4 marks)