

One and a half hours

Question ONE and Question THREE are COMPULSORY

**UNIVERSITY OF MANCHESTER  
SCHOOL OF COMPUTER SCIENCE**

Software Engineering

Date: Friday 29th May 2015

Time: 14:00 - 15:30

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**Answer ALL of Question ONE  
Question 2: Answer Either Question 2.1 OR Question 2.2  
and  
Answer ALL of Question THREE**

**Use a SEPARATE answerbook for EACH Question.**

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This is a CLOSED book examination

The use of electronic calculators is NOT permitted

**[PTO]**

**Question 1 Answer ALL Questions**

- a) What is a software development process? Why do we need software development processes? (2 marks)
- b) Briefly describe the incremental software development process. (2 marks)
- c) Briefly explain the four reasons for measuring software. (2 marks)
- d) What is the role of a software engineer? (2 marks)
- e) Explain this statement: “Lines of code are a poor indicator of software productivity.” (2 marks)
- f) Explain in terms of cohesion and coupling whether in the IBMS scenario of your team project it would have been a good idea to have a single class, which integrates the roster and the driver timetables it produces. You should consider both kinds of coupling mentioned in the lectures. (2 marks)
- g) What would be a sensible class structure for the roster and the driver timetables it produces? (2 marks)
- h) What is the key idea of Test-Driven Development (TDD) and how did you apply TDD in your IBMS implementation? (2 marks)
- i) Explain why a programmer testing their own code is often not appropriate, and a traditional method (not TDD) for overcoming this. (2 marks)
- j) State two advantages of TDD over traditional testing. (2 marks)

**Question 2 Answer Either Question 2.1 OR Question 2.2**

**2.1** Consider this scenario for an online retailer: “After placing two books in a shopping basket, the customer proceeded to checkout and made the payment by using a credit card.”

- a) Draw a domain model of this scenario by using a UML class diagram. (6 marks)
- b) Explain the relationships between the domain classes and the meaning of the multiplicities on the relationships. (4 marks)

**2.2** Answer the following questions:

- a) What type of architecture does your IBMS system have? Briefly describe its main components. (2 marks)
- b) What is a domain model? What is the role of a domain model in software development? (2 marks)
- c) What is a “Pure Fabrication”? Why do we need Pure Fabrications? State an example that uses a Pure Fabrication in software design. (3 marks)
- d) Function points can be used to measure the functionality offered by a system. Explain how to calculate a function point count for a system. (3 marks)

**Question 3 Answer ALL Questions**

- a) Briefly explain the role of GRASP patterns in object-oriented software development. (2 marks)
- b) You are designing a system to test students in English language skills in order to find people who need to take remedial English classes. You have elicited the following requirements about the structure of the tests.

*A test consists of one or more sections, each of which is timed separately. Each section contains one or more subsections, each of which is on a particular topic. Each subsection contains one or more questions. Questions are of three different types: multiple choice questions, “fill in the blank” (FIB) questions and essay questions. Multiple choice questions have two or more options.*

Draw a class diagram which BOTH captures all and only the information given in the above description AND leads directly to a design which adheres to GRASP principles. (6 marks)

- c) Suggest two pure fabrications (other than UI classes) which could be added to the domain-inspired classes to help complete the design. (2 marks)

**END OF EXAMINATION**