

**A27229**

*No Calculator permitted in this examination*

# UNIVERSITY OF BIRMINGHAM

School of Computer Science

First Year – MSc Computer Science  
First Year – MSc Financial Engineering

**06 21936**

Fundamentals: Software Engineering

Summer Examinations 2013

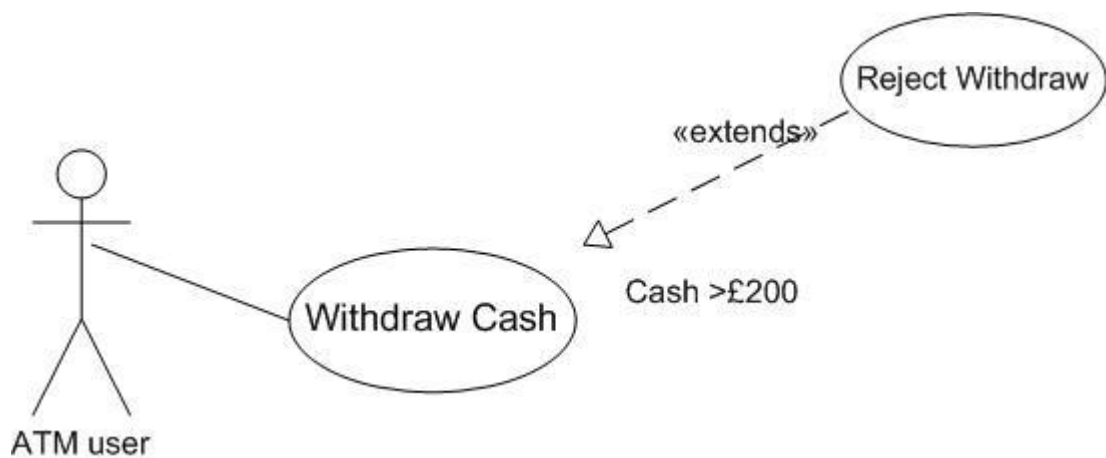
Time allowed: 1 hr 30 min

[Answer ALL Questions]

[Answer All Questions]

1. Consider an **Online Flight Booking System**, where users can sign up for the service to view available flights, reserve and book flights, view and get promotional offers, book hotels at the flight destination, pay online for flights/hotels bookings using credit/debit cards, view history of transactions, update their profiles, receive notifications of bookings to e-mails and mobile phone, and print receipts for all the carried transactions. The system is connected to a consortium representing credit/debit card companies for verifying cards and handling payments. The system is designed to be available 24/7. The system can handle up to 300 online users during off-peak time. Users' profiles, itineraries and transactions are stored and backed up to two distinct locations (one in UK and another in USA) for safety. All transaction information passed by the online booking system to the credit/debit card consortium are secure and encrypted using 128-bit SSL certificates. Processing of online payments should not exceed 40 seconds.
  - (a) Specify FIVE **functional requirements** of the Online Flight Booking system. Make use of **MoSCoW** in your specification. [12%]
  - (b) Specify FIVE **non-functional requirements** of the Online Flight Booking system. Specify the type of non-functional requirement using Sommerville's categorisation for non-functional requirements. Make use of **MoSCoW** in your specification. [12%]
  - (c) Identify three dimensions of **dependability** for the above case. Briefly discuss the trade-offs involved. [6%]
2. Describe the **Rational Unified Process** by referring to its classical phases and how they relate to the software engineering disciplines. Highlight a major advantage of adopting such a model. [10%]

3. The diagram below models an aspect of an ATM system:



- (a) Describe TWO **scenarios**, with different outcomes, corresponding to this figure. [10%]
- (b) Provide TWO **test cases**, corresponding to the above diagram. [5%]
- (c) Consider the **Withdraw Cash** use case. Document this use case using **Pre-conditions, flow of events and post-conditions**. [5%]

4. Consider an **Online Car Rental System**, where users can signup for the service to view available cars, reserve and book cars, view and get promotional offers, pay online for car rentals using credit/debit cards, view history of transactions, update their profiles, receive notifications of booking to e-mails and mobile phone, and print receipts for all the carried transactions. The system is connected to a consortium handling credit/debit card transactions.
- (a) Draft a **use case diagram** for the **Online Car Rental System**. Identify eight use cases related to the system. Make use of both <<include>> and <<extend>> stereotypes. State any necessary assumptions you make.  
[15%]
- (b) Draft a **sequence diagram** for modelling a scenario, to pay online for the car booked using the Car Rental System. State any necessary assumptions you make.  
[10%]
- (c) Draft a **collaboration diagram** for the same scenario you have modelled in (b). Make sure that both diagrams are consistent.  
[5%]
- (d) Draft a **three-tier architecture** for the Online Car Rental System. Clearly identify the components of each tier. Make use of UML in modelling. State any necessary assumptions you make.  
[10%]