

Two hours - online

The exam will be taken on line.
This paper version is made available as a backup
In this event, only MCQ answers written in the boxes on the exam paper will be marked.

EXAM PAPER MUST NOT BE REMOVED FROM THE EXAM ROOM

**UNIVERSITY OF MANCHESTER
SCHOOL OF COMPUTER SCIENCE**

Component-based Software Development

Date: Thursday 25th May 2017

Time: 09:45 - 11:45

Please answer All Questions in Section A and any TWO Questions in Section B

This is a CLOSED book examination

The use of electronic calculators is NOT permitted

[PTO]

*Section A contains
MCQ questions and is
restricted, therefore
we are unable to
publish this Section.*

Section B

Answer any TWO questions in this section.

Diagrams should be drawn and labelled clearly in paper answer books which should be submitted offline.

2. Consider an electronic shopping cart system, which allows online customers to accumulate a list of items for purchase. Specifically, the system enables a customer to add items to the cart, change their quantities or remove them. Upon checkout, in case of a registered customer, the system verifies his/her credentials (email address and password). Otherwise, in case of an unregistered buyer, the system requires his/her full name, postal address (including postcode), and email address. Once the customer is verified or has provided the required information, the system calculates the order's total cost, including shipping and handling (i.e. postage and packing) charges and any associated taxes, as applicable. The system also accepts a voucher code for a discount. Finally, a customer can choose to pay with a debit card, a credit card or a gift card. As soon as the payment is authorised, the system generates an invoice, which contains the order ID, the list of purchased items and the total cost, and sends it to the customer's email address.

Use the X-MAN component model to build a system for the shopping cart. You should explain your answer clearly.

- i) Identify the required components. For each component, list its provided services. (5 marks)
 - ii) Use suitable connectors to implement the system. (5 marks)
 - iii) Identify the services provided by the system. (5 marks)
 - iv) Specify 5 data channels in the system. (5 marks)
3. Consider the electronic shopping cart system in Question 2. Use EJB to build this system. You should explain your answer clearly.
- i) Identify the required beans. For each bean, list its interface. (5 marks)
 - ii) Design the system using the identified beans. (5 marks)
 - iii) Use a suitable notation to express the control flow in your system. (5 marks)
 - iv) Identify any client application and interfaces involved. (5 marks)

4. Consider the shopping cart system in Question 2, use UML 2.0 components to build this system. You should explain your answer clearly.
- i) Identify the components and their required and provided services. (5 marks)
 - ii) Design the system using the identified components. (5 marks)
 - iii) Show the system's behaviour. You can use any UML notation, e.g. sequence diagram. (5 marks)
 - iv) Identify the required and provided system services. (5 marks)