

Two hours - online hybrid

EXAM PAPER MUST NOT BE REMOVED FROM THE EXAM ROOM

**UNIVERSITY OF MANCHESTER
SCHOOL OF COMPUTER SCIENCE**

Component-based Software Development

Date: Thursday 30th May 2019

Time: 14:00 - 16:00

This is a hybrid examination with sections to be answered online and questions to be answered on paper

**Please answer ALL 20 Questions in Section A online
Please answer BOTH Questions in Section B in a separate answerbook**

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This is a CLOSED book examination

The use of electronic calculators is NOT permitted

[PTO]

*Section A contains
multiple choice
questions and is,
therefore, restricted*

Section B

Answer all the questions in this section.

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

2. Consider a vending machine that sells coffee and tea. The customer can choose *coffee* (which comes in two forms: *Latte* or *Mocha*), or *tea*, and add milk or sugar if desired; and the vending machine will display the total price for the customer's choice. The customer can choose to pay with cash or card; and for a cash payment, the vending machine can give change if necessary. Once switched on, the vending system will keep working until the power is turned off.

Use the X-MAN component model to design and build a system for the vending machine. You should explain your answer clearly.

- i) Identify the required components. For each component, list its provided services. (5 marks)
 - ii) Use X-MAN notation to implement the system. Also identify the connectors needed to construct 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 vending machine in Question 2. Use UML2.0 to design and 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. activity or state diagram. (5 marks)
 - iv) Identify the required and provided system services. (5 marks)