

**Ollscoil na hÉireann
The National University of Ireland**

**Coláiste na hOllscoile, Corcaigh
University College, Cork**

Mid-Semester Examination
Semester 1 - Winter 2018

**CS6321 Model-Based Software Development
2018-2019**

M.Sc. Computer Science

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Answer all questions

Total marks: 40

Time: 50 minutes

Minutes per mark: 1.25

- a) Describe, giving a reason, a particular project/application where Agile would **not** be appropriate. (2 marks)
- b) In your opinion, what are the two most important advantages of model-based software development? (2 marks)
- c) In your opinion, what are the two most important disadvantages of model-based software development? (2 marks)
- d) Discuss briefly whether you think an Agile process and model-based software development can work well together. (2 marks)
- e) Given only the class diagrams of a software system, how might you evaluate how well the system has been implemented, and explain your answer. (3 marks)
- f) Explain what is meant by Larman's **Protected Variation** software design pattern? (2 marks)
- g) Explain how Larman's Gang of Four (GoF) software design pattern, **Factory**, relates to (some of) Larman's basic 9 GRASP patterns? (3 marks)

A software system is being developed for an online flight reservation application; this will support services such as browsing flights, reserving and paying for flights. Base your answers for questions (h) - (p) on Larman's Agile Unified Process (AUP), and ensure answers are relevant to this system.

- h) Draw a use case diagram for the system showing **four important** use cases. (2 marks)
- i) What is the purpose of use cases in Larman's AUP? (1 mark)
- j) Write down the full use case text for **one important** use case. (2 marks)
- k) Construct a (problem) domain model for the online flight application. (2 marks)
- l) State two reasons for developing the domain model. (2 marks)
- m) Construct two **system** sequence diagram for this application. (2 marks)
- n) What is the purpose of **system** sequence diagrams? (1 marks)
- o) Describe the next stage in Larman's AUP, involving designing the solution, and explain how it relates to the previous steps. (4 marks)
- p) Describe any issues that might arise with data persistence (e.g. storing data in a database), and describe a solution that might be implemented, and how it relates to Larman's basic software design principles. (4 marks)
- q) Explain the difference between **hard** real-time and **soft** real-time systems. (2 marks)
- r) Model-based development using UML's Statecharts notation is often preferred to direct coding for real-time systems. State two reasons for this. (2 marks)