Beijing-Dublin International College

SEMESTER 1 FINAL EXAMINATION - (2018/2019)

School of Computer Science

COMP3013J Object-Oriented Design

Prof. Pádraig Cunningham
Dr. Seán Russell*

Time Allowed: 120 minutes

Instructions for Candidates:

Answer Question 1 and any 3 other Questions.

BJUT Student ID:_____   **UCD Student ID:**_____

I have read and clearly understand the Examination Rules of both Beijing University of Technology and University College Dublin. I am aware of the Punishment for Violating the Rules of Beijing University of Technology and/or University College Dublin. I hereby promise to abide by the relevant rules and regulations by not giving or receiving any help during the exam. If caught violating the rules, I accept the punishment thereof.

Honesty Pledge:_____ **(Signature)**

Instructions for Invigilators

Non-programmable calculators are permitted.

No rough-work paper is to be provided for candidates.

Question 1: Short Questions

a. Explain in your own words the Single Responsibility Principle. What is the desired result of this principle? **(5%)**

b. Describe the meaning of aggregation in UML. What are the formal properties of aggregation? **(5%)**

c. What is an N-ary association? Draw a diagram showing an n-ary association. **(5%)**

d. What is typically shown on a component diagram? In what way can this type of diagram be useful? **(5%)**

e. Explain the meaning of the term hotspot in reference to application frameworks. Describe an example of a hotspot class and where it might be used. **(5%)**

f. Explain in general terms what situation requires a statechart to be developed for a class. What exactly does a statechart tell us about the object it represents? **(5%)**

g. Name the 5 core values of eXtreme Programming (XP). **(5%)**

h. Distinguish between Iterative development and Incremental development. **(5%)**

(Question Total 40%)

Question 2: Methodology

a. Discuss the problem of keeping code and models consistent. How can this be addressed in the unified process and extreme programming? **(10%)**

b. Discuss the importance of testing in large scale software development. In particular contrast the approaches to testing the in waterfall model and in the unified process.

(10%)

(Question Total 20%)

Question 3: Patterns

a. Explain the idea behind the Observer pattern. Draw a typical class diagram for this pattern. **(10%)**

b. Explain the idea behind the Singleton pattern. Give example code showing how the singleton pattern is implemented. **(10%)**

(Question Total 20%)

Question 4: Modelling

a. Draw a UML class diagram that models showing classes that could be used to remember the following facts about a sports tournament. Carefully explain the design decisions that you have made, as well as any limitations of your model.

- For each team in the tournament we record their name and the name of the city they are based in

- Teams play each other in games multiple times in the year and for each game we record the teams involved as well as the final scores of each team

- Games are played in one of the two teams home cities and this location is remembered

- The tournament remembers all of the teams as well as the games that have been played

(10%)

b. Based on the class diagram you have completed in the previous question, write the basic definitions of the classes modelled. In these classes you only need to implement the associations and attributes, implementing methods or constructors is not required.

(10%)

(Question Total 20%)

Question 5: Code Metrics

a. Explain the Coupling between object classes (CBO) metric in your own words. What are the potential consequences of high values for this metric? **(10%)**

b. Explain the Response For a Class (RFC) metric in your own words. What are the potential consequences of high values for this metric? **(10%)**

(Question Total 20%)