**DUBLIN INSTITUTE OF TECHNOLOGY**

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# BSc. (Honours) Degree in Computer Science (DT228)

# BSc. Degree International in Computer Science (DT282)

## Year 2

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### WINTER EXAMINATIONS
### 2016/2017

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## SOFTWARE ENGINEERING 1

**INTERNAL EXAMINERS**
MR RICHARD LAWLOR
DR. DEIRDRE LILLIS

**EXTERNAL EXAMINER**
Mr P Collins

DAY XX<sup>TH</sup> JANUARY
16.00 – 18.00 ??

2 HOURS

INSTRUCTIONS TO CANDIDATES
ANSWER **FOUR** QUESTIONS OUT OF **FIVE**.
ALL QUESTIONS CARRY EQUAL MARKS.

**1. (a)** Show how the following class diagram could be reified by introducing a linking class so that a person can work more than 1 job at a company or work for different companies.

Then provide an object diagram to show a snapshot of this design.



(7 marks)

**(b)** Provide a USE specification for the class diagram in part (a) including any operations and attributes you deem appropriate. In your USE code, include SOIL implementation of the operations.

(10 marks)

**(c)** Explain what an interface is and provide two ways of showing one in UML. Then comment on the meaning of the following UML diagram.



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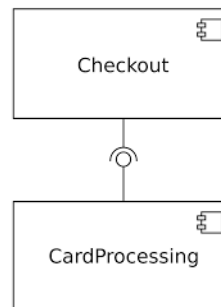
(8 marks)

**2. (a)** Provide a use case description for the following 2 related library use cases:
- borrow book
- borrow book and pay fine

and draw a corresponding use case diagram.
When is it appropriate to split a use-case using extends?

(10 marks)

**(b)** Explain what is meant by use-case realisation.

(5 marks)

**(c)** Create a USE model which can be used to do a use-case realisation for the "borrow book" use-case from part (a) and describe briefly how "borrow book" might be simulated. Also draw a sequence diagram as part of your answer.

(10 marks)

**3. (a)** Outline the stages of the *waterfall* process model and then discuss the major problems associated with it.

Is the waterfall process model suitable for any type of software development?

(15 marks)

**(b)** Comment on four aspects in which *Iterative and Incremental* processes can help overcome some of the issues connected with the waterfall process.

(10 marks)

**4. (a)** Briefly explain what is meant by the terms *modularity, cohesion* and *coupling* within the context of software design and programming and then discuss their relevance.

(10 marks)

**(b)** How are coupling and cohesion affected by inheritance in object-oriented design and/or programming?

(8 marks)

**(c)** Describe three types of coupling.

(7 marks)

**5. (a)** Explain what design patterns are and comment on how they may help software design.

(8 marks)

**(b)** Draw an object diagram which illustrates what is meant by a part-whole hierarchy.

With the aid of a class diagram and comments, describe an appropriate design for interacting with part-whole hierarchies in a uniform way.

(10 marks)

**(c)** How can a one-to-many class association be implemented in Java?

(7 marks)