COMMONWEALTH OF AUSTRALIA

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Warning

CHARLES DARWIN UNIVERSITY

Family Name	
Given Names	
Student Number	
Teaching Period	Semester 1, 2016

FINAL EXAMINATION	**DURATION**
PRT451 – Principles of Software Systems	Reading Time: **10** minutes Writing Time: **180** minutes

INSTRUCTIONS TO CANDIDATES

1.1 The examination has **1** section. There are 8 questions. You must answer all questions.

Suggested Time:	180 minutes Marks:100

All questions must be answered in the Answer Booklet provided. Please ensure that your name and student number are clearly indicated on your Answer Booklet and at the top of this examination paper.

1.2 Note that questions **ARE NOT** of equal value.
1.3 Read **ALL** questions carefully.

EXAM CONDITIONS

You may begin writing from the commencement of the examination session. The reading time indicated above is provided as a guide only.

This is a RESTRICTED OPEN BOOK examination

Any non-programmable calculator is permitted

One A4 sheet of handwritten double-sided notes permitted

Hard copy, unannotated English translation dictionary only

ADDITIONAL AUTHORISED MATERIALS	EXAMINATION MATERIALS TO BE SUPPLIED
No additional printed material is permitted	1 x 20 Page Book

THIS EXAMINATION IS PRINTED DOUBLE-SIDED.

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Only 1 Section

Short Essay Questions

Total No of Marks for this section: 100

This section should be answered in the Answer Booklet provided.

Each question has few parts and marks for each question are indicated.
Suggested Time allocation: 180 minutes

Question 1

(a) What are the essential attributes of good software? Explain the 3 general issues that affect many different types of software.

(Marks: 4)

(b) Non-functional requirements are an important part of requirements analysis. How are these handled in agile development? Give an example of using interest to model the overhead of a non-functional requirement in agile.

(Marks: 4)

(c) Compare the two different requirements tools: user case and user story.

(Marks: 2)

(d) Please design test cases to cover all the branches of the following piece of code.

```
Start
Input ( a, b, c, d)
If  (( a > 0 ) and ( b>0 ))
  Then   x = a + b
Else    X =  a – b
If  (( c>a  ) or ( d< b ))
   Then    Y  = c – d
Else    Y = c + d
Print  ( X, Y )
End
```

(Marks: 4)

Question 2

(a) What are the 5 principal stages of the waterfall model and what fundamental activities involved in each stage?

(Marks: 5)

(b) It has been suggested that one of the problems of having a user closely involved with a software development team is that they 'go native'. That is, they adopt the outlook of the development team and lose sight of the needs of their user colleagues. Suggest three ways how you might avoid this problem and discuss the advantages and disadvantages of each approach.

(Marks: 3)

(c) When prototyping can be used? What are the advantages of providing static and dynamic views of the software process as in the Rational Unified Process?

(Marks: 5)

Question 3

(a) What is the manifesto for Agile and what are the principles behind it?

(Marks: 4)

(b) List 6 Extreme Programming Practices with their descriptions.

(Marks: 4)

(c) Draw a tree structured chart to demonstrate types of non-functional requirement.

(Marks: 4)

Question 4

(a) How do you understand requirements engineering is an iterative process in which the activities are interleaved in practice?

(Marks: 4)

(b) When do you need to carry out requirements validation and list the checks which will be included for validation?

(Marks: 4)

(c) Using your knowledge of a self-book-lending system, draw a flow chart (or process model) that models the processing involved when a customer borrows a book via this system.

(Marks: 5)

Question 5

(a) Draw a class diagram for a scenario of an exam system. The process flow is outlined below.

i. Students attend Classes;
ii. Teachers mark attendance;
iii. Teachers prepare Exam papers;
iv. Students write Exam papers;
v. Teachers check exam papers;
vi. Teachers declare results;

(Marks: 4)

(b) As an architect, you are required to make architectural design decisions. Please outline the aspects that you may consider to make such decisions.

(Marks: 4)

(c) The ultimate goal of verification and validation processes is to establish confidence that the software system is good enough for its intended use. What does the level of required confidence depends on? Please justify your argument for each item.

(Marks: 4)

Question 6

(a) What is regression testing? Explain how the use of automated tests and a testing framework such as JUnit simplifies regression testing. What do you understand by the term 'stress testing'? Suggest how you might stress test the MHC-PMS.

(Marks: 4)

(b) Explain why design conflicts might arise when designing an architecture for which both performance and security requirements are the most important non-functional requirements.

(Marks: 4)

(c) We use behavioural model to understand the dynamic behaviour of the system while it is executing. Explain with example any one of the stimuli that can be used to stimulate your chosen system to understand the behaviour of the system.

(Marks: 3)

Question 7

(a) Please draw a user case diagram for a weather station system.

i. Information Collector inputs weather data into the weather station system;
ii. System Administrator shuts down the weather station system;
iii. System Administrator restarts the weather station system;
iv. System Administrator configures the weather station system;
v. Weather reporter views the weather data from the weather station system;

(Marks: 5)

(b) Please draw sequence diagram according to the following scenario about customer buying product from an automatic vending machine.

i. A Customer insert coins to the Front;
ii. The Register counts the coins;
iii. The Register provides product list;
iv. The Customer chooses a product;
v. The Dispenser delivers the product to the Customer;

(Marks: 5)

(c) What is the difference between 'Software Inspection' and 'Software Testing'?

(Marks: 3)

Question 8

(a) What are Design Pattern and its features?

(Marks: 5)

(b) Draw a UML activity model that illustrates how the software transforms an input blood sugar level to a sequence of commands that drive the insulin pump. If this is a safety-critical system then what are the two essential high-level requirements that this system must met?

(Marks: 4)

(c) If you are asked to take your software to the next level of development (considering major development), what sort of development you will bring to your developed software.

(Marks: 3)