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Family Name					
Given Name/s					
Student Number					
Teaching Period	Semester 1, 2018				

PRT451 – Principles of Software Systems	DURATION	
	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 <u>ALL</u> questions carefully.		
EXAM CONDITIONS		
<u>You may begin writing from the commencement of the examination session.</u> The reading time indicated above is provided as a guide only.		
This is a RESTRICTED OPEN BOOK examination		
No calculators are permitted		
One A4 sheet of handwritten double-sided notes permitted		
No dictionaries are permitted		
ADDITIONAL AUTHORISED MATERIALS	EXAMINATION MATERIALS TO BE SUPPLIED	
No additional printed material is permitted	1 x 20 Page Book	

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DOUBLE-SIDED.**

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Section A

Short Essay Questions

Total No of Marks for this section: 100

This section should be answered in the Answer Booklet provided.

Marks for each question are indicated. Suggested Time allocation for Section B: 180 mins

Question 1

- (a) Scott Peck defines evil as fear and laziness. That is the avoidance of change and choosing to avoid extending yourself. Explain this behaviour in relation to the ACS code of ethics. (Marks: 5)
- (b) It goes without saying that you should uphold normal standards of honesty and integrity. You should not use your skills and abilities to behave in a dishonest way or in a way that will bring disrepute to the software engineering profession. However, there are areas where standards of acceptable behaviour are not bound by laws but by the more tenuous notion of professional responsibility. Identify at least four areas and explain them in relation to professional responsibility. (Marks: 5)

Question 2

- (a) Evaluate the techniques used to record non-functional requirements in agile environment. Your evaluation should include comparative analysis of the techniques you identified for recording non-functional requirements. (Marks: 5)
- (b) Explain the 5 principles of agile methods. In the test-first development the tests of the code implementing that feature are written before the code. Although a test-first development is an efficient approach of software development but there are some possible problems it can have. Explain those problems. (Marks: 5)

Question 3

- (a) Explain why incremental development is the most effective approach for developing business software systems. Why is this model less appropriate for real-time engineering? (Marks: 5)
- (b) Describe the main activities in the software design process and the outputs of these activities. Using a diagram, show possible relationships between the outputs of these activities. (Marks: 5)

Question 4

(a) Changing adds to the costs of software development because it usually means that work that has been completed should be redone. Point out two related approaches which may be used to reduce the costs of rework.

(Marks: 5)

(b) It is found that there has been a great deal of interest in scaling agile methods to cope with larger systems, developed by large organizations. Summarise how large software system development differs from small system development in practicing agile process.

(Marks: 5)

(c) During software development, it is quite common to use open-source software as part of your software product. In this case licensing issues are important because if you use open-source software as part of a software product, then you may be obliged by the terms of the license to make your own product open source. Discuss the three most important licensing used for open source product.

(Marks: 5)

Question 5

(a) Design the process model of the MHC-PMS that describes the process of involuntary detention of patients who are suffering from mental health problems and may be a danger to others or to themselves. You should use the UML activity diagram to construct the process model.

(Marks: 5)

(b) Create the class diagram of an online shopping domain. Your diagram should accommodate the classes of all the major operations of an online shopping domain.

(Marks: 5)

(c) Show the use case diagram of an Online Job Portal System accommodating actors for both registered and unregistered job seeker and employer.

(Marks: 5)

Question 6

(a) Draw state diagrams of the control software for:

- Automatic washing machine
- Microwave oven

(Marks: 8)

(b) Design 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: 5)

Question 7

- (a) Requirements engineering process includes four high-level process activities. After an initial feasibility study, the next stage of the requirements engineering process is requirements elicitation and analysis. Explain with block diagram the process activities included in a process model of the elicitation and the analysis process.

(Marks: 4)

- (b) Using the UML graphical notation for object classes, design the following object classes, identifying attributes and operations. Use your own experience to decide on the attributes and operations that should be associated with these objects.

- a telephone
- a bank account

(Marks: 8)

Question 8

- (a) A small company has developed a specialized product that it configures specially for each customer. New customers usually have specific requirements to be incorporated into their system, and they pay for these to be developed. The company has an opportunity to bid for a new contract, which would more than double its customer base. The new customer also wishes to have some involvement in the configuration of the system. Explain why, in these circumstances, it might be a good idea for the company owning the software to make it open source.

(Marks: 5)

- (b) In software development, change happens all the time, so change management is essential. Configuration management is the name given to the general process of managing a changing software system. Explain with example the three fundamental configuration management activities available for monitoring changes.

(Marks: 5)

- (c) Argue why a software system that is used in a real-world environment must change or become progressively less useful.

(Marks: 5)