

University of St Andrews



DECEMBER 2019 EXAMINATION DIET

SCHOOL OF COMPUTER SCIENCE

MODULE CODE: CS5030

MODULE TITLE: Software Engineering Principles

EXAM DURATION: 2 hours

EXAM INSTRUCTIONS:

- (a) Answer **three** questions.
- (b) Each question carries 20 marks.
- (c) Answer questions in the script book.

PERMITTED MATERIALS: Non-programmable calculator

YOU MUST HAND IN THIS EXAM PAPER AT THE END OF THE EXAM.

**DO NOT TURN OVER THIS EXAM PAPER UNTIL
YOU ARE INSTRUCTED TO DO SO.**

1. Software Processes and Testing

- (a) Give two advantages and two disadvantages of an iterative development process such as Agile. [4 marks]
- (b) What kind of process model would be appropriate for developing an online Question and Answer website, such as Stack Overflow or Quora? Justify your answer. [3 marks]
- (c) Describe how Agile methods help support software evolution. [4 marks]
- (d) Giving an example, explain what is meant by the term “legacy system”. [3 marks]
- (e) Discuss the factors which affect how a legacy system is managed. [6 marks]

[Total marks 20]

2. Requirements and Modelling

- (a) What is meant by the following terms?
 - (i) Functional requirements [2 marks]
 - (ii) Non-functional requirements [1 mark]
 - (iii) Domain requirements [1 mark]
- (b) Give three examples of non-functional requirements for an online group chat system (e.g. WhatsApp or Facebook Messenger). [3 marks]
- (c) Explain how functional requirements can arise from non-functional requirements, using the online group chat system in Question 2(b) to illustrate your answer. [4 marks]
- (d) A good requirements specification should be: precise; valid; complete; consistent, and verifiable. Explain what is meant by each of these terms. [5 marks]
- (e) What steps can you take to ensure that a requirements specification is complete? [4 marks]

[Total marks 20]

3. Project and Risk Management

- (a) What are the success criteria for project management? [4 marks]
- (b) Large software projects are often one-off projects. What challenges does this pose for project management? [4 marks]
- (c) Part of the Project Manager's job is Risk Management. Describe the four steps involved in the risk management process. [4 marks]
- (d) Briefly describe a strategy for managing each of the following risks:
 - (i) Difficulty in recruiting developers [2 marks]
 - (ii) Staff leaving during product development [2 marks]
 - (iii) Libraries or tools (e.g. a database) are defective or have unacceptable performance [2 marks]
 - (iv) Changes to requirements are proposed which will require major design modifications [2 marks]

[Total marks 20]

4. Dependability and Safety

- (a) Explain why the dependability of a system is a subjective judgement. [2 marks]
- (b) Which dependability attributes are likely to be most important for the following systems? Justify your answer in each case.
 - (i) A telecommunications system such as a mobile phone network [2 marks]
 - (ii) A railway signalling system [2 marks]
 - (iii) An online shopping system [2 marks]
- (c) What is meant by “Safety” as a property of a system? [2 marks]
- (d) How can a reliable system be unsafe? [3 marks]
- (e) Identify a consumer product which is likely to be controlled by a safety critical system, and suggest *two* hazards which may arise in the system. [3 marks]
- (f) When might formal methods and verification be cost effective in developing safety critical systems? [4 marks]

[Total marks 20]

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