



# UNIVERSITY *of* LIMERICK

O L L S C O I L L U I M N I G H

COLLEGE *of* INFORMATICS *and* ELECTRONICS

Department of Computer Science  
and Information Systems

## **End-of-Semester Assessment Paper (REPEAT)**

Academic Year:	2006/2007	Semester:	Repeat
Module Title:	Software Quality	Module Code:	CS4157
Duration of Exam:	2½ Hours	Percent of Total Marks:	100
Lecturer(s):	Michael T. Lane	Paper marked out of :	100

**For Exam creation:**

### **Instructions to Candidates:**

- 7 Questions. Please answer any 4 questions
- Each question is 25 marks. Note that sub-parts of questions carry different amounts of marks.

- Q1. a) Describe the fundamental differences between software products and other industrial products that have an impact on quality. Your description should include differences in characteristics of the products and also of their development and production processes.
- 8 Marks
- b) Distinguish between software errors, software faults and software failures.
- 6 Marks
- c) Define the terms “validation” , “verifcation” and “qualification” in the context of software quality assurance. Using the Systems Development Lifecycle Model (SDLC or “Waterfall model”), show how you might apply these three qa activities in a development project.
- 11 Marks
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- Q 2. a) The maintenance policy is identified as a foundation of high-quality maintenance.
1. List the main policies considered in a maintenance policy.
  2. Describe how these policies can be applied, giving reasons why a particular application of a policy may be more preferable over other possible applications.
- 4 Marks
- b) A software system comprises of four main components.
1. List the four components of a software system.
  2. How does the quality of each component contribute to the quality of the developed software?
- 8 Marks
- c) Present a high-level overview of the different quality assurance components that may be used by a software development team. (Hint: Present your answer in the context of any components that should be reviewed prior to the outset of the project and also the components that should be used during the two main phases of a software product lifecycle). Each component name should be supported by a 1-2 line description.
- 13 Marks

- Q 3. Software development companies often need to define the quality of the software produced by their projects. A mechanism that may be used is to apply a number of quality factors to the software requirements. A team may determine what attributes are deemed most important for the product and subsequent reviews and tests could focus on whether the selected quality attributes are being addressed.

Describe in detail McCall's quality factors model, showing different categories of factors and explaining what aspects of the software are addressed by each factor. In your explanation of each factor, briefly describe how you would test the system to ensure that it exhibits the required level of quality related to that factor.

25 Marks

- Q 4. a) Appendix B outlines a scenario related to a requirement for a pricing module of the proposed software package. Using this scenario, describe to your friend the concept of "equivalence class partitioning". Support your description with 5 valid test cases built using this approach and 2 invalid test cases. Be sure to include in your description the concepts of valid and invalid equivalence classes.

13 Marks

- b) Many software development companies have introduced automated testing to their testing strategies. Describe the different types of automated tests and various advantages that may be gained from conducting certain automated testing.

7 Marks

- c) Describe the different phases of the testing process. Your description should highlight those phases that are necessary regardless of whether the testing is manual or automated. Describe how the introduction of automated testing results in additional expenses that are not present when only performing manual tests.

5 Marks

- Q5. a) List three objectives of development and quality plans. 3 Marks
- b) Explain the difference between baseline and intermediate software configuration versions 4 Marks
- c) Provide an overview of configuration management systems. You must describe their purpose, concepts such as software configuration items and versions, and the various tasks involved with software configuration management. Your answer should outline how you would use a configuration management system in the development of a software system 18 Marks
- Q6. a) List the four types of review methodologies discussed by Galin. 2 Marks
- b) Two of the review methodologies mentioned by Galin fall under the category of “peer reviews”. Compare and contrast these two processes. 8 Marks
- c) Identify and describe the elements of a quality plan 5 Marks
- d) Imagine that you are a member of a software development team that consists of a project leader, business analyst, three coders, one tester and a technical person responsible for supporting the team with issues such as configuration management. Describe how each member of such a team would use different sections of a quality plan to control and direct their duties. Use your answer from part c) above to guide you and outline how each of the different elements may be used by different team members. 10 Marks

Q 7. a) List the different levels of the Capability Maturity Model and provide a 1 to 2 line description of each level.

5 Marks

b) As organizations mature, they will need to introduce measurements of various activities to the workplace in order to understand and control productivity. Provide a description of metrics, ensuring that you differentiate between product and process metrics. Describe any two metrics of your choice and how you would apply them in a software development organization.

7 Marks

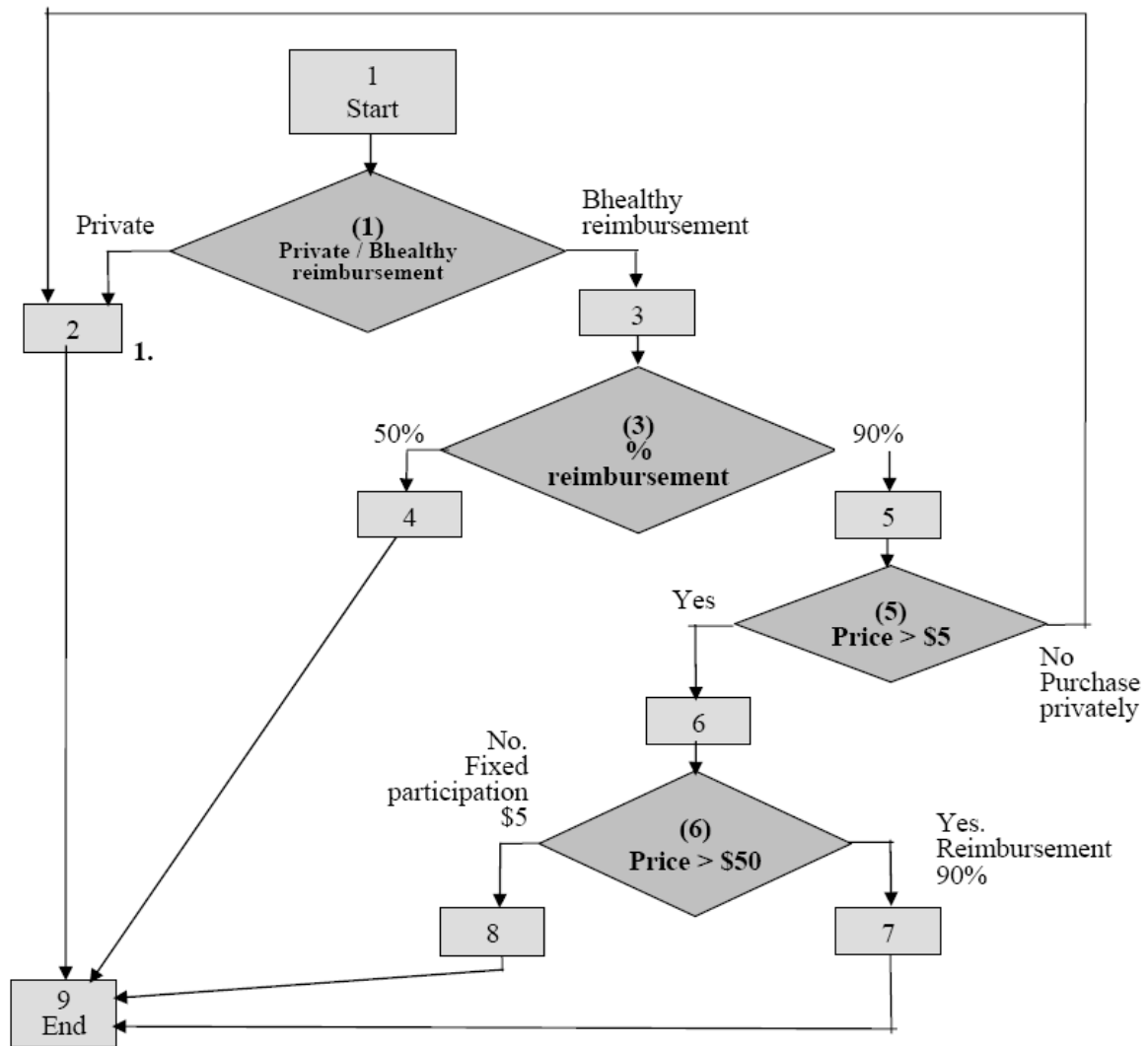
c) Appendix A contains a sample flow chart of a software system. Use McCabe's cyclomatic complexity metric approach as presented in this module to determine the complexity of this system. You need to convert the flow chart to a flow graph and then describe and use all three formulae suggested by McCabe. Note that all three formulae should result in the same complexity measurement!

6 Marks

d) Software development projects often require up-front estimation of the development effort in order to schedule the work and plan dependent initiatives such as marketing of the completed system. One system that may be used to estimate software development projects is the function point method of pre-project estimation. Describe this approach. Your description should be a high level overview of the different stages of this method. Explain why this method is more suited to upfront estimation than the KLOC measurement for software size.

7 Marks

## APPENDIX A



## APPENDIX B

A ticket pricing system for a tour bus is based upon certain criteria:

Passenger status: Student or regular

Duration of tour: One-day (S) tour or multiple days(M)

Tour departure day: Weekdays are different cost to weekends.

Tour departure time: 9:00 – 12:00; 12:01 –19:00;

Departure Day	Mon, Tue, Wed,Thu, Fri				Sat, Sun			
Passenger Status	Student	Regular	Student	Regular	Student	Regular	Student	Regular
Tour Duration	S	S	M	M	S	S	M	M
Ticket Prices								
Departure Time								
9:00 – 12:00	3	5	4	6	5	8	8	10
12:01 –19:00	2	4	3	5	4	7	7	9