

GX 1488

Ollscoil na hÉireann, Gaillimh  
National University of Ireland, Galway

Semester I Examinations 2003/2004

Exam Code(s)	4IF1
Exam(s)	BSc Information Technology
Module Code(s)	CT417
Module(s)	Software Engineering III
Paper No.	1
Repeat Paper	No
External Examiner(s)	Prof. P. Nixon
Internal Examiner(s)	Professor G. Lyons Dr. O. Molloy Dr. S. Flynn

Instructions:

Answer 5 Questions. Answer at least 2 questions from each section.  
Use Separate Answer Books for Each Section.  
All questions carry equal marks.

Duration	3hrs
No. of Answer Books	2

Requirements:

Handout  
MCQ  
Statistical Tables  
Graph Paper  
Log Graph Paper  
Other Material

No. of Pages	6 (including cover page)
Department(s)	Information Technology

**OLLSCOIL NA hÉIREANN**  
**The National University of Ireland, Galway**

**SEMESTER I EXAMINATIONS 2003**

**B.Sc. Degree Examination in Information Technology**

**SOFTWARE ENGINEERING III (CT417)**

Professor P. Nixon  
Professor G. Lyons  
Dr. S. Flynn  
Dr. O. Molloy

**Time Allowed : Three Hours**

Candidates should attempt five questions, at least two from each section.

Please use separate answer books for each section.

All questions carry equal marks

**SECTION A**

- 1.(a) An small bank is embarking on a major software development project which will directly affect the way it does business – it plans to make as much as possible of it's banking services available online. This will include such services as checking of account balances, credit transfers, loan applications, and so on. The relatively small IT team in the bank has only worked on some unrelated small web development projects in the past, and it is likely that a new project manager, and possibly appropriate technical staff, will need to be recruited to work on the project. The IT manager believes in the project, but has yet to convince a number of sceptics on the board to commit all the funding required to see the project to completion. Describe in as much detail as possible the activities which would be needed to develop a risk management strategy for the project, under the following headings:

- ❖ Risk identification
- ❖ Risk projection
- ❖ Risk assessment
- ❖ Risk management

(10)

- (b) In the context of Risk Management, give two examples of each of the following types of risks for the project described above:

- ❖ Customer risks
- ❖ Business risks
- ❖ Application risks

(5)

- (c) Describe two different risk identification techniques and compare their relative merits.

(5)

2. (a) Contrast the following software system architecture types in terms of flexibility, maintainability, scalability, and software and personnel costs:

- ❖ 2-tier Client/Server
- ❖ 3-tier Client / Server

(6)

- (b) Describe the role of distributed component-based systems in developing business systems that can evolve to adapt to changing requirements.

(6)

- (c) A prospective client (a consultancy company) hires you to advise on the possible ways they could implement a new client-server system to allow users (consultants working on assignments) to access their project database, both at the central office, and while working at client locations. It is not expected that the total number of concurrent users will ever exceed 25. While at work the users will require full integration with their desktop productivity tools (such as word processor, spreadsheet application, etc.), but will just need to be able to check their project assignments and enter timesheet type information (e.g. number of hours worked per project per day) from client locations.

Describe the type of solution you would propose.

(8)

3. (a) Discuss briefly the following traits of successful project managers:

- ❖ Problem solving ability
- ❖ Managerial Identity
- ❖ People Skills

(6)

- (b) Discuss the influence of the following project characteristics on project team structure:

- ❖ Difficulty

- ❖ Modularity
- ❖ Rigidity of Delivery Date
- ❖ Degree of internal team communication required

(6)

- (c) An organisation wishes to appoint a software project manager. The job is to build an application that is similar to others that one of its teams has built, although this one is larger and more complex. Requirements have been documented. Describe the team structure you would recommend for this project, and your reasoning for the structure chosen

(8)

4. (a) Your fledgling software development business has been asked to develop an application for a market gardener to help run her successful business. She has not been able to find a suitable off-the-shelf package to suit her kind of business. The client is not computer literate and has limited time to devote to the project personally. Discuss how the following factors will influence the price you charge to deliver the system.

- ❖ Market Opportunity
- ❖ Requirements Volatility
- ❖ Uncertainty in your cost estimate

(8)

- (b) Discuss the relative merits of the following estimation techniques in developing your cost estimate for the above system, and how you would approach the task in each case:

- ❖ Algorithmic models such as COCOMO or Function Points
- ❖ Price to Win
- ❖ Top-Down estimation
- ❖ Parkinson's Law

(6)

- (c) Assuming a labour rate of €5,000 per month and an average productivity of 400 LOC per month, calculate the estimated cost and effort (in person-months) for the project to develop the system containing the software components listed in the table below.

(6)

Estimation Table	
Software Components	Estimated LOC
User interface and control facilities	2,400
2D geometric analysis	4,800
3D geometric analysis	3,200
Database management	2,400
Computer graphics display facilities	4,000
Peripheral control	2,800
Design analysis modules	8,400

## SECTION B

5. (a) Crosby defines quality as "zero defects". Comment on the usefulness of this definition in the context of software. (6)
- (b) ISO 9126 is meant to be a general model of software quality that can be used by anyone involved with software. Is it sensible to have a general model? How does it help in comparing the quality of two different products? (8)
- (c) Many aspects of software products, projects and processes can be measured. Describe how the Goal-Question-Metric approach can be used to identify appropriate metrics. (6)
6. (a) Suggest reasons why a software inspections programme may fail. (6)
- (b) You are asked to initiate a programme of inspections in a company, as part of an overall quality improvement programme. What steps would you take to avoid the reasons for failure you identified in part (a)? (6)
- (c) You are working in a QA role in a large software company. Suppose you are tracking the defect density in a series of similar products, so that you can monitor the effectiveness of a new inspection process that has been introduced. Over time, you notice that the defect density decreases. Suggest reasons for the falling defect density. (8)
7. (a) Describe the architecture of the ISO9000:2000 standard. How does its structure compare with the ISO15504 (SPICE) model? (6)
- (b) Three of the process areas identified in ISO9000 are:  
7.2 Customer related processes  
7.4 Purchasing  
8.2 Monitoring and measurement  
Choosing any two of these, describe how they could be applied to the software industry. (8)
- (c) You are a software engineer in a small/medium software company. The president of your company has learned about ISO9000 and insists that the company become certified. How would you explain to your colleagues the benefits of certification? (6)
8. (a) The Shewhart (PDCA) model is used for continuous process improvement, and consists of four steps: plan, do, check, act. Describe the steps in the model and show how they form the basis for Software Process Improvement. (6)

- (b) The five maturity levels of the staged CMMI are: Initial, Repeatable, Defined, Managed and Optimising. Describe the characteristics of the first three levels. Why is it not generally possible to skip levels? (8)
- (c) It has been claimed that staff involvement is a vital part in a successful SPI programme. Discuss ways in which staff involvement could be cultivated. (6)