

University of Swaziland
Department of Computer Science

Final Examination
December 2012

Title of paper : Software Engineering I

Course number : CS451

Time Allowed : Three(3) hours

Instructions :

- *Each question is worth 25 marks*
- *Answer Question 1*
- *Answer any three(3) questions from questions 2 to 6*

This paper may not be opened until permission has been granted by the invigilator

Case study

(Questions 1 and 2 are based on the following descriptive case study)

An electronic tutor-marked assignment (eTMA) system

An eTMA is a web based system that allows students to submit their answers to tutor-marked assignments (TMAs) electronically, as computer files, to the University via a website. Before submitting an assignment, a student is required to login to the website using his/her student identity number and password. Each login transaction is verified against the student information database kept by the system. Whenever a TMA file is submitted, it is stored in a central database and a 'receipt' (a simple message containing a unique reference number) is sent to the student to acknowledge that the TMA has been received. Tutors (Teaching Assistants) are informed, by email, that a TMA is waiting for them to be marked.

A database of all the tutors is kept by the system. The system enables tutors to login and download their students' submissions, mark and comment on the assignments 'on-screen' and submit the marked TMAs back to the University. Tutors are also responsible for recording the marks obtained in each assignment. A marked TMA is stored in a database and the student is informed, by email, that their TMA has been marked and is available to be retrieved electronically.

Question 1 - compulsory

(a) Draw a context diagram based on the description of an eTMA system given above.

5 marks

(b) Draw a top-level (level 1) logical data flow diagram for the eTMA system.

20 marks

Question 2

Based on the description of an eTMA system and your understanding of the the University of Swaziland operations, write a draft Software Requirements Specification (SRS) document. Where necessary, clearly state your assumptions. Your answer must demonstrate your understanding of the general contents and required characteristics of a SRS document.

25 marks

Question 3

(a) With the aid of examples, explain why data stores may need to be normalized.

3 marks

(b) Using Armstrong's axioms, state and prove the correctness of the **union rule**.

3 marks

(c) Explain the meaning of the terms: *lossless-join* decomposition and *dependency preserving* decomposition.

4 marks

(d) Consider the following Project Management Report card.

Project Management Report				
Project Code:		PC010		
Project Title:		Pensions System		
Project Manager:		M Philips		Project Budget:
				£24,500
Employee No.	Employee Name	Department No.	Department Name	Hourly Rate

S10001	A Smith	L004	IT	£22.00
S10030	L Jones	L023	Pensions	£18.50
S21010	P Lewis	L004	IT	£21.00
S00232	R Smith	L003	Programming	£26.00

Total Staff on Project: 4			Average Hourly Rate:	£21.88

Describe the data contained in the card in *Unnormalized form*, *First normal form*, *Second normal form* and *Third normal form* relations. Show that each decomposition is lossless and dependency preserving

15 marks

Question 4

(a) Using the mini-project you did in this course as an example, Write a draft outline of a project plan. Your answer must reflect the main sections found in a typical plan with a brief description of the information that should appear in each section. 10 marks

(b) Discuss the usefulness of PERT and GANTT charts in project management.

4 marks

(c) Consider the following project schedule.

TASK	Predecessor Tasks	Time (weeks)
A	-	3
B	-	5
C	-	7
D	A	8
E	B	5
F	C	5
G	E	4
H	F	5
I	D	6
J	G,H	4

(i) Draw a PERT diagram for the above project plan.

4 marks

(ii) What is the earliest completion time for the project?

2 mark

(iii) What is the critical path of the project? What is significant of knowing the critical path?

2 mark

(iv) What is the additional cost to the project if task D took 3 more weeks than scheduled?

3 marks

Question 5

- (a) Define the term Software Engineering. 5 marks
- (b) Define the term Software Method 5 marks
- (c) Briefly describe the steps involved in the Jackson Structured Programming method. 5 marks
- (d) With reference to the SSA/SD method, explain the *transaction analysis* and *transform analysis* steps. 10 marks

Question 6

- (a) “*Software Development is a partnership between the client and the software developer*”. Discuss the truthfulness of this assertion and the particular challenges it poses in the software development process. 5 marks
- (b) What are the critical issues in hierarchical team organization. 5 marks
- (c) Highlight the differences between a chief programmer team, a SWAT team and an open structured team. 5 marks
- (d) Consider the mini-project you have been involved in this course. Which style of coordination mechanism or management best fits this project. Do you consider the management to have been adequate?. If not, highlight the issues that could have been improved? 10 marks