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UNIVERSITY OF LONDON

279 0061 ZB

BSc degrees and Diplomas for Graduates in Economics, Management, Finance and the Social Sciences, the Diploma in Economics and Access Route for Students in the External Programme

Software Engineering

Thursday, 18 May 2006 : 10.00am to 1.00pm

Candidates should answer **FOUR** of the following **SEVEN** questions. All questions carry equal marks.

PLEASE TURN OVER

1. The Waterfall Model is well known as the traditional approach towards software development.
- (a) Describe the phases of the Waterfall Model. **(10 marks)**
 - (b) Outline the underlying principle of the Waterfall Model and characterize a software engineering project for which such a development approach is most suitable. **(5 marks)**
 - (c) Describe an alternative development approach and explain under what circumstances a project manager might choose this approach over the Waterfall Model. **(10 marks)**
2. A company is undertaking bespoke development of a new information system to support the activities in its Sales Department. The company's manager is complaining about the time it takes to develop the new system. In particular, he criticizes the amount of time that is being put into the system analysis stage.
- (a) Write a note to the manager in which you explain:
 - i. What the purpose of the system analysis stage is. **(3 marks)**
 - ii. What the main problems are the system analyst has to cope with. **(4 marks)**
 - iii. The possible consequences of reducing the time invested into this stage. **(6 marks)**
 - (b) Describe how the following techniques support systems analysis and give examples of how they can be used in the context of a Sales Department:
 - i. The Dataflow Diagram. **(6 marks)**
 - ii. The Class Diagram. **(6 marks)**

PLEASE TURN OVER

3. Software testing is an important part of software engineering.

(a) Outline the difference between white box and black box testing.

(5 marks)

(b) Consider the simplified procedure below. It goes through 50 integers stored in an array and calculates the average of all the integers that are greater or equal to 34 (e.g. the average of all pass marks in 50 exams).

Use this code to demonstrate how the white box testing technique of basis path testing works. Your explanation should include the suggestion of suitable test cases.

PROCEDURE average;

TYPE

numberlist = ARRAY [1..50] OF integer;

VAR

i, sum, totalpassed, totalinput: integer;

average: real;

BEGIN

i = 1; (1)

totalpassed = 0; (2)

totalinput = 0; (3)

sum=0; (4)

WHILE totalinput < 50 DO (5)

totalinput := totalinput + 1 (6)

IF numberlist[i] > 33 THEN (7)

sum:= sum + numberlist[i] (8)

totalpassed = totalpassed + 1 (9)

ENDIF (10)

i := i + 1 (11)

END (*while*) (12)

average := sum/totalpassed; (13)

(*we assume that totalpassed > 0*)

END average; (14)

(20 marks)

4. Once a software system has been put into operation it continues to require maintenance.
- (a) Outline the main activities involved in software maintenance and discuss the problems associated with software maintenance. **(10 marks)**
 - (b) With the help of examples discuss how important these different kinds of maintenance are and make suggestions of how their associated problems can be avoided or addressed. **(10 marks)**
 - (c) How does software maintenance of a bespoke developed system differ from the maintenance of a software package? **(5 marks)**
5. Object-oriented software engineering has become very popular.
- (a) With the help of an example define the terms object, encapsulation, and polymorphism. **(5 marks)**
 - (b) With the help of an example, possibly from your project, explain how the Class Diagram (in UML) incorporates the idea of object-orientation. **(10 marks)**
 - (c) Take your example further to explain how the sequence diagram complements the Class Diagram. **(10 marks)**
6. The user interface is often crucial to the successful deployment of a software system.
- (a) Why is it that these days the user interface has become so significant? **(5 marks)**
 - (b) With the help of examples, from both your project and other systems you have encountered, describe the characteristics that make a good user interface. **(20 marks)**
7. Good Project Management can be crucial to the success of a Software Project.
- (a) With the help of an example explain what Critical Path Analysis is and how it may support the Software Project Management task of scheduling. **(10 marks)**
 - (b) A further major task of Project Management is Effort Estimation. Explain what this task involves and how it relates to the task of scheduling. **(10 marks)**
 - (c) The task of Effort Estimation for an IS project is considered to be very difficult. Explain why. **(5 marks)**

END OF PAPER

