



INSTITUTE OF TECHNOLOGY TRALEE

WINTER EXAMINATIONS AY 2013-2014

Software Engineering

Module Code SWEN 61000
CRN 43842

External Examiner(s): Ms. Sabrina Spillane

Internal Examiner(s): Ms. Catherine Woods

Duration: 2 Hours

Instructions to Candidates: Answer question 1 and **two** other questions.

Question 1 [40 Marks]

The following functional requirements have been identified for a proposed banking system:

The system must be able to open accounts for both new and existing customers. Bank accounts may have at most two account holders. A bank account has an account type (*Current*, *Savings* or *Fixed Term Deposit*), the details of which are stored in the *AccountTypes* file.

When an account is opened, the account is assigned an account number and the required account type is specified. The date the account is opened is set to the current system date, the account balance is set to zero and the account status is set to 'active'. If the customer is an existing customer, the customer details are retrieved from the *Customer file* (and the *Joint Customer file* if there are two account holders). Otherwise, the customer details must be provided. The details of the account are recorded in the *Accounts file* and in the case of a new customer, the customer details are recorded in the *Customer file*. If the account is held by joint customers, details of the second customer are recorded in the *Joint Customer file*. The system must also be able to close an account, in which event the account status is set to 'closed'. The system must also be able to print a statement of accounts for a customer (a list of all accounts and current balance held by a customer) when requested to do so.

Money may be deposited to or withdrawn from an account. Details of each transaction are recorded in the *Transaction file*. The transaction date, type and amount must be recorded for each transaction. At the end of each month, the system generates an account statement for each account. This statement details the transactions that occurred during the specified month.

A customer pays a bank charge for each account transaction. The applicable charge for a transaction is held in the *Transaction Charges file*. The total bank charges for an account are determined at the end of each month and debited to the account balance.

- (a) Draw a hierarchy chart representing the functional components of the system. **(5 marks)**
- (b) Identify the external entities, data stores and processes required to implement the system described above. **(5 marks)**
- (c) Draw Level-0, Level-1 and level-2 DFD's for the above system. Clearly label all processes, data stores and data flows. **(20 marks)**
- (d) Give a comprehensive listing of the file structure of each file in the system. **(10 marks)**

Question 2 [30 Marks]

- (a) What are software requirements and how does UML support the specification of software requirements? **(6 marks)**
- (b) What is a *Program Specification* and what information is typically contained in a Program specification? Illustrate your answer with an example. **(6 marks)**
- (c) In relation to software testing, explain the following test strategies: **(8marks)**
 - Unit test
 - Inegration Test
 - System Test
 - Acceptance test
 - Regression Test
- (d) Following the requirements specification, projected costs and benefits have been identified for a project. **(10 marks)**

The analyst has estimated development costs to be €85,000 with annual benefits of €28,000. Given a five year investment period with a fixed rate interest of 3.5%:

- (i) Show the table of benefits and present values
- (j) Calculate the payback period of the investment
- (k) Determine the NPV of the investment
- (l) Is this a good investment? Explain your answer.

Question 3 [30 Marks]

- (a) Describe briefly the four process activities performed in any software engineering (5marks) process.
- (b) Explain the differences between the *Waterfall* process model and the *Evolutionary* (5 marks) process model.
- (c) In relation to the agile methodology *Scrum*, give a detailed explanation of the following: (15 marks)
- Scrum Artifacts (Burndown chart, Product Backlog, Sprint Backlog)
 - Scrum Roles (Product Owner, Scrum Master, Scrum Team)
 - Scrum Planning & Review meetings (Daily Scrum, Sprint Review, Sprint retrospective)
- (d) Explain, using examples, the following Scrum concepts: (5 marks)
- User Story
 - Story points
 - User Story Tasks
 - Acceptance Criteria

Question 4 [30 Marks]

- (a) Outline briefly the main considerations in the management of a software project? (5 marks)
- (b) Explain the following in relation to the CPM network analysis methodology: (5 marks)
- (i) Activity (ii) Dummy activity
- (iii) Event (iv) EET and LET
- (v) Critical path
- (c) A project has the following tasks and requirements:

Activity	Pre-Activity	Duration (in days)	Resources (people)
A	-	2	2
B	A	1	2
C	A	3	2
D	B	1	1
E	B	2	1
F	D	1	2
G	E	1	2
H	C	2	1
I	G,H	1	3

- (i) Draw the network diagram for the above project and determine the critical path. (8)
- (ii) Represent the project activities on a Gantt chart. (2)
- (iii) Draw a Resource Aggregation Profile (RAP) for the project. (6)
- (iv) Management have imposed a constraint of a maximum of four people on the project. (4)
- Show a levelled RAP. Is completion time of the project extended?
- (Note: Total Float = $LET_H - EET_T - \text{Duration}$).