INSTITUTE OF TECHNOLOGY TRALEE

WINTER EXAMINATIONS AY 2015-2016

Software Engineering

Module Code SWEN61000
CRN 43842

External Examiner(s): Ms Sabrina Spillane

Internal Examiner(s): Ms Catherine Woods

Duration: 2 Hours

Instructions to Candidates: This paper contains four questions. Answer any ***three*** questions.

Question 1 [40 Marks]

(a) Describe briefly the four activities conducted in a software engineering project. **(6 Marks)**

(b) Describe how the *Waterfall* process model differs from an iterative approach to software development. Your answer should make reference to the main characteristics of both process models. **(8 Marks)**

(c) What are the four main characteristics of an agile approach to software development? **(4 Marks)**

(d) A scrum team is described as *cross-functional* and *self-organising*. Discuss. **(4 Marks)**

(e) Explain the following Scrum terms: **(6 Marks)**

- Sprint
- Story points
- Print Velocity

(f) Discuss in detail the following elements of the Scrum framework: **(12 Marks)**

- Scrum roles and responsibilities
- Scrum artefacts
- Scrum meetings

Question 2 [40 Marks]

(a) What is software testing and why do we test software? **(2 Marks)**

(b) Explain, using examples, the difference between syntax, semantic and run-time errors. **(3 Marks)**

(c) How does black-box testing differ from white box testing and when is each approach typically used during software testing? **(5 Marks)**

(d) Describe the following test strategies: **(10 Marks)**

- Unit test
- Acceptance test
- Regression test
- Stress test
- Volume test

(e) A software engineering project has a development cost of €53,000.
Annual benefits are estimated to be €12,500 per year.
Given a current interest rate of 5% and an investment period of 5 years:

(i) Show the table of benefits and present values. **(10 Marks)**
(ii) Calculate the payback period of the investment. **(5 marks)**
(iii) Determine the net present value (NPV) of the investment. **(3 Marks)**
(iv) Is this a good investment? Justify your answer. **(2 Mark)**

Question 3 [40 Marks]

(a) Explain the difference between functional and non-functional software requirements. **(2 Marks)**

(b) What is UML and what role does UML play in the software engineering process? **(5 Marks)**

(c) What methods are typically used during software requirements analysis? **(3 Marks)**

(d) In relation to Use case modelling, explain, using examples, the following terms:

(i) Actor (1 Mark)
(ii) Primary Actor Vs Participating Actor (2 Marks)
(iii) Use case (2 Marks)
(iv) Inclusion use case (3 Marks)
(v) Extension use case (3 Marks)
(vi) Expected Scenario (2 Marks)
(vii) Alternate Scenario (2 Marks)

(e) What is the objective of a UML Activity diagram and what role does it play in requirements specification activity? **(5 Marks)**

(f) Customer details are stored in the Customer file. A requirement which allows customer details to be amended is required. The users have asked that customer selection is by surname.

Using UML notation, draw an activity diagram which illustrates the interaction between the user and the software (system) and which details all tasks to be performed by each. **(10 Marks)**

Question 4 [40 Marks]

A concert promotion enterprise has decided to implement an on-line ticket administration system. The appointed systems analyst has identified the following functional requirements:

The enterprise records details of each venue at which concerts may be held. Each venue has an identification number and has a name, address and contact details. Each venue also has a capacity for seated and standing tickets. Venue details, when validated, are recorded in the Venue File. If a venue closes or the enterprise is no longer using a venue, then the system must reflect this fact. A venue status might be 'Open', 'Closed' or 'No longer used. The system allows venue details to be changed when required but only if the venue status is 'Open'.

When the enterprise secures an artist/band to perform a concert, the artist details are recorded in the Artist File. Each artist is identified by an artist identification number and has a name, agent name, agent contact details and fee (for playing the gig).

An artist is scheduled to perform a concert at a chosen venue. Details of each concert scheduled are recorded in the Concert File. Each concert has a concert identification number, an artist, a venue, a concert date and a status of 'Scheduled'. In addition, the price per seated ticket and standing ticket is recorded. The system can produce a list of forthcoming concerts which can be printed if required. The system can also produce a list of all concerts which have sold out. A concert may be cancelled, but only if no tickets have been sold.

Customers purchase tickets for a concert on-line. Each sale is identified by a sale transaction number. The details of each sale are recorded in the Sales File and include sale transaction number, customer surname and forename, telephone number, sale date, number and type of each ticket purchased. Refunds are not permitted on sales. The system can produce a profile for a concert if required. This profile shows the scheduled concert details, the number of tickets sold and available and the total revenue achieved to date. This profile may be printed if required.

(a) Draw a hierarchy chart representing the functional components of the system. **(2 marks)**

(b) Identify the external entities, data stores and processes required to implement the system described above. **(10 marks)**

(c) Draw the Level-0 and Level-1 for the above system. Clearly label all processes, data stores and data flows. **(10 marks)**

(d) Draw any required level-2 DFDs for the above system. **(12 marks)**

(e) Give a comprehensive listing of the **file structure** for the Sales file and the Concerts file. **(6 marks)**