# ATHLONE INSTITUTE OF TECHNOLOGY

# SCHOOL OF ENGINEERING

# SEMESTER 1 EXAMINATIONS 2016

## December Session

**BACHELOR OF SCIENCE IN SOFTWARE DESIGN**

**YEAR 3**

**SOFTWARE ENGINEERING 3**

**External Examiner(s): Mr. Jerh O'Connor**
**Dr. Steven Davy**

**Internal Examiner(s): Mr. Michael P. Russell**

**Instructions to candidates:**
Read all questions carefully.
All questions carry equal marks.
Answer **ALL** questions.

***Time Allowed: 2 Hrs***

***No. of pages including cover sheet: 3***

Question 1

(a) What is the most important difference between generic software product development and custom software development? What might this mean in practice for users of generic software products?

(4 marks)

(b) Giving reasons for your answer based on the type of system being developed, suggest the most appropriate generic software process model that might be used as a basis for managing the development of the following systems:

- A system to control anti-lock braking in a car
- A virtual reality system to support software maintenance
- A university accounting system that replaces an existing system
- An interactive travel planning system that helps users plan journeys with the lowest environmental impact.

(8 marks)

(c) Explain how the principles underlying agile methods lead to the accelerated development and deployment of software.

(8 marks)

**[20 marks]**

Question 2

(a) Fixed-price contracts, where the contractor bids a fixed price to complete a system development, may be used to move project risk from client to contractor. If anything goes wrong, the contractor has to pay. Suggest how the use of such contracts may increase the likelihood that product risks will arise.

(5 marks)

(b) Cost estimates are inherently risky, irrespective of the estimation technique used. Suggest five ways in which the risk in a cost estimate can be reduced.

(5 marks)

(c) A software manager is in charge of the development of a safety-critical software system, which is designed to control a radiotherapy machine to treat patients suffering from cancer. This system is embedded in the machine and must run on a special-purpose processor with a fixed amount of memory (256 Mbytes). The machine communicates with a patient database system to obtain the details of the patient and, after treatment, automatically records the radiation dose delivered and other treatment details in the database.

The COCOMO method is used to estimate the effort required to develop this system and an estimate of 26 person-months is computed. All cost driver multipliers were set to 1 when making this estimate.

Explain why this estimate should be adjusted to take project, personnel, product and organizational factors into account. Suggest four factors that might have significant effects on the initial COCOMO estimate and propose possible values for these factors. Justify why you have included each factor.

(10 marks)

**[20 marks]**

Question 3

(a) Explain how standards may be used to capture organizational wisdom about effective methods of software development. Suggest four types of knowledge that might be captured in organizational standards.

(8 marks)

(b) What are the important differences between the agile approach and the process maturity approach to software process improvement?

(6 marks)

(c) Describe three types of software process metric that may be collected as part of a process improvement process. Give one example of each type of metric.

(6 marks)

**[20 marks]**