

May 2019 National Examination
04-SOFT-A5: Requirements and Specifications
(3 hours duration)

Notes:

1. If a doubt exists as to the interpretation of any question, the candidate is urged to submit, with the answer sheets, a clear statement of any assumptions made.
2. This is an open-book exam.
3. No calculator is permitted.
4. Most questions are open-ended and require an answer in essay format. The candidate should write clearly and organize her or his answer with care.
5. This exam has 12 pages including this page and space for answers. Write your answers in the space provided. Do not be verbose.
6. The maximum points possible on this examination is 75 points.

Question 1: Stakeholders. (10 points)

Suppose one is gathering requirements for a smart home for seniors. The goal is to automate that which does not really need human interaction, to free the occupants to enjoy themselves in their retirement. The system will not free the mundane household chores from any human interaction, but it will require only as little as needed.

A *partial* user/stakeholder profile looks like this:

Stakeholder	Interests	Constraints
Local building codes	Ensuring the safety for the building for the inhabitants.	Multiple business codes, especially around electrical interfaces.
Home owners	Inhabitants interested in easing their lives.	None.
Interior designers	Ensuring the functionality of the system does not deter from the aesthetic.	None.
Building architect	Ensuring the existing structure can support the improvements.	None.
Children of home owners	Ease of use for the occasional user.	None.

1. Would pets be part of the user/stakeholder profile? (2 points)
2. Would relatives of the home owners be part of the user/stakeholder profile? If yes, what are their interests? (3 points)
3. If one of the close relatives of the home owners uses a wheelchair, how would that be reflected in the stakeholder profile? (2 points)
4. Identify at least one other stakeholder (not mentioned in the partial profile or in the questions above) and indicate what the interests and constraints for this stakeholder would be? (3 points)

(Answer on the next page in the space provided.)

Space for Answering Question 1.

Question 2: Requirements Elicitation. (5 points)

What are some difficulties that may be encountered in eliciting requirements without face-to-face interactions with stakeholders?

Space for Answering Question 2.

Question 3: Software Requirements Specification. (15 points)

Given that you are developing a commercial-off-the-shelf (COTS) product that consists of a 3-inch touch-screen that can act as a digital emergency stop button. The interface is completely red with the text "STOP" in white letters in the middle of the screen. Additionally, this COTS is connected via an USB cable to the system it should stop and has a simple external API that allows the COTS to be accessed through the COM port. When the touch screen stop button is pressed, the COTS simply sends a 1-bit interrupt signal to the COM port, 0 when everything is okay and 1 to cause an interrupt.

This COTS has the following requirements:

- a. The system GUI shall be completely red with a centred text that says "STOP" with white letters.
 - b. The system shall send a 1-bit interrupt signal on the COM port if pressed.
 - c. The system shall have a 3-inch touch screen monitor.
 - d. The 3-inch touch screen must react by sending an interrupt signal within 0.1 seconds after being pressed.
1. This specification is written as a product specification. Is the requirements specification complete? Why or why not? (3 points)
 2. Which quality attributes – if any – does the specification (all the requirements together) not fulfill? Briefly discuss why. (4 points)
 3. Why quality attributes, if any, do the individual requirements not fulfill? Briefly discuss why. (8 points)

(Answer on the next page in the space provided.)

Space for Answering Question 3.

Question 4: Non-functional Requirements. (20 points)

Answer, in essay format, the following questions regarding non-functional requirements.

- (i) What are non-functional requirements? (5 points)
- (ii) How do non-functional requirements map to a use-case model? (5 points)
- (iii) Suppose you are involved in developing software requirements for a life-critical avionics system. Describe three non-functional requirements (or software quality attributes) that this system should possess. You should describe each of the three requirements briefly. (10 points)

Space for Answering Question 4.

Space for Answering Question 4 (continued)

Question 5: Use Cases (5 points)

What is the relationship between use cases and tests? Answer briefly.

Space for Answering Question 5.

Question 6: External Quality Attributes (10 points)

What is the difference between *reliability* and *robustness*? Discuss the difference using an example.

Space for Question 6.

Question 7: Agile Methodologies. (5 points)

Why can it be difficult for agile methodologies to cover non-functional requirements?
Discuss briefly.

Space for Answering Question 7.

Question 8: Requirements Management and Evolution. (5 points)

Should a request to add or change features be anonymous? Explain your answer briefly.

Space for Answering Question 8.