

## Software Engineering and Project Management - Written Exam

2023-06-10. **Duration:** 14:00 - 17:00

Start by reading all the questions, to see if anything is unclear. If a question is unclear, please write down your assumptions about the question and proceed to answer it.

The exam has a total of 40 points and you need 21 points to pass the exam (extra points will be added afterwards, once the exam is already graded). The grade is on the scale U/G.

Answers must be written in English. Dictionaries may be used.

**Start each numbered question on a new page. Please hand in the pages in the correct order.**

For each question, I give the maximum points of the answer.

The format and extension of your answer should adapt to the type of questions:

- **Specific questions:** a concept, a list... the *optimal* answer is usually around a single paragraph (This does not include drawing).
- **Short questions:** explanations, reviews, comparisons... the *optimal* answer is usually a few (2 or 3) paragraphs (This does not include drawing).
- **Questions for reasoning:** your arguments are presented in a concise, well-reasoned way,... and written with your own words. The *optimal* answer is usually less than 2 pages. (This does not include drawing).

A checklist of common mistakes that cost points:

- Answer all **5** questions. A bad answer never gives less points than no answer.
- Read the question again after you have written the answer. Verify that you have actually answered the question. Verify that you answered *all* parts. Verify that you have *not* hidden the answer between many other irrelevant comments about the topic. *Cursives are added to highlight the key elements of the questions.*
- In particular, don't forget to give an example if that is requested, and make it a concrete one.
- When a question asks you to compare two things A and B, make sure to highlight the contrasts: their differences. I do *not* want a full description of A and a full description of B, leaving it to me to find the differences. It is better to use tables than paragraphs of text to compare.

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## Specific questions.

### Question 1. [3 points].

*Describe* how the distributed components architectural pattern works.

### Question 2. [3 points].

*Describe* what are the key elements that distinguish the waterfall model and the V-model software engineering processes : *Enumerate* at least two (2) differences and one (1) *similarity*. Three (3) in total.

## Short questions.

### Question 3. [6 points].

**3.a (2/6 points)** *Explain* what is the role of the *Forming* phase according to the Tuckman Team Model.

**3.b (2/6 points)** *Explain* what is the role of the *Storming* phase according to the Tuckman Team Model.

**3.c (2/6 points)** *Compare* the Tuckman Team Model and the GRIP model: *Indicate* at least two (2) differences and one (1) similarity between them. Three (3) in total.

## Questions for reasoning.

### Question 4. [14 points].

**4.a (3/14 points)** *Explain step by step* the pre-checking activity, with special emphasis on *which* are the actors involved and *what* is their role.

**4.b (3/14 points)** *Propose* and *describe* a different type of inspection method than a pre-checking, which also guarantees that everything will be inspected. *Indicate* also one (1) *advantage* of the selected method. Call such method B.

**4.c (5/14 points)** In the context of the inspection activity described in 4b., *choose* one (1) inspection activity that your team will perform in order to *validate* the process described in 4b. The activity must be different from the pre-checking and the activity described in 4b. Then, *justify why* this particular inspection activity is the best one.

**4.d (3/14 points)** Provide a *description* of a less suitable activity than the one you have chosen (method B). *Justify* your answer.

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**Question 5. [14 points].**

Your company has been tasked with the development of a new augmented reality headset (ARH) for kids with hearing problems - e.g., kids who cannot hear sounds too soft. The final application is intended to be available at a premium price for small kids. You and your team are in charge only of the development of the software.

The ARH has a 4K transparent display that allows the users to see what is around them and, on top of that, some digital information. The ARH will be equipped with 3 ambient microphones that capture all sounds in a radius of 15 meters. Then, it will display the sounds graphically on the display.

Finally, privacy is of the most concern to your company.

**5.a (5/14 points)** Explain step by step the process of requirements engineering, with special emphasis on which actors and/or stakeholders are responsible for each step of the process and *what* are their responsibilities.

**5.b (3/14 points)** Formulate two (2) non-functional requirements, each one of different type, for the software described at the beginning of this question. *Indicate* the type of each requirement.

**5.c (6/14 points)** Formulate one (1) complete functional requirement, with a corresponding diagram, related to the application described at the beginning of this question. Include *at least* one (1) alternate flow and one (1) exception flow.