



MScIT Sem III Final Examination
IT619: Design of Software Systems

Date: Dec 7, 2022

Duration: 3 hours

Max. Marks: 100

Instructions:

- All questions are compulsory.
- Figures to the right indicate full marks.
- Do not insist or make requests about talking or interacting with your course instructors during the examination. No such requests would be considered.

Q.1. Answer the following questions briefly.

(20 x 2) = 40

- Compare gold plating vs. ivory tower as architecture design anti-patterns.
- Summarise key lessons from the Browser war case study.
- Define: sprint backlog, product backlog.
- Ideal days and project velocity are two key indicators of any agile project. Summarise them to show their significance.
- What do you understand by relationships like association, dependency, and generalization? How are they represented using respective notations in a typical UML class diagram?
- How are terms actors, use-cases, system boundary, and scenarios relevant in the context of UML 2.x diagrams?
- What aspects are generally considered during design of data and reference architectural models?
- Depict using suitable diagram how agile methodology supports requirements/functionality changes.
- Summarise different forms of OCL constraints.
- Summarise the role of scrum master in software projects using agile methodologies.
- How are <<includes>> and <<extends>> different? Construct a suitable UML diagram to depict how usage of <<includes>> and <<extends>> may look acceptable as per UML notations, however, still be considered a wrong/bad software design decision/choice.
- How is typical daily scrum meeting conducted?
- Summarise different message types along with their respective notations used in UML interaction models.
- What do you understand by different abstractions of a class model? Summarize using a suitable example UML class diagram.
- What are interactions occurrences and combined fragments equivalent to when compared to typical programming constructs? Why are they used in sequence diagrams?
- While using objects in an OO design using UML, what typical information generally gets referred to while citing objects in any software design model?

- g) Summarise a typical template for textual use cases generally used in design documentation.
- h) Summarise using suitable diagram elements of an activity model.
- i) What are the various types of OCL collection types? Summarise.
- j) How are UML communication and timing diagrams related as well as different from sequence diagrams?

Q.2. Answer the following questions in detail.

(5 x 3) = 15

- a) What do you mean by software architecture/design evaluation? What typical challenges are faced by software designers in such an evaluation process?
- b) Differentiate in detail Type I and Type II Technical Debt (TD).
- c) What is the utility of general hierarchy pattern? Give two suitable examples along with necessary UML diagrams showing the problems targeted by such a design pattern.
- d) What methods are deployed to make the technical debt of software companies more visible?
- e) How is availability a significant quality attribute for cloud-based software solutions? Summarise four key issues relevant to it.

Q.3. Give suitable diagram(s) for each of the following.

(3 x 5) = 15

- a) Elements of a typical UML state diagram.
- b) Working of the scrum process model as an agile methodology.
- c) Performance and scalability scenario for any competitive exams (UPSC, JEE, etc.) server.

Q.4. Give suitable design models as directed for each of the following.

(6 x 5) = 30

- a) Considering that the working of a typical bank ATM system is known, identify relevant use cases, actors and their relationships, and depict the same using a suitable UML use-case model.
- b) Considering that you have been using the DA-IICT e-campus solution, model its working using a suitable UML activity diagram.
- c) Considering that you have been using various online shopping portals / apps (e.g., Flipkart, Amazon, etc.), model using a suitable UML state-chart diagram a scenario to login, browse products, and finally creating your product(s) order using cash-on-delivery (COD) option before logging out.
- d) UML design model depicting assets, threats, risks, counter measures, and vulnerabilities while considering system security.
- e) Considering that you have been using various subscription-based OTT apps (Zee5, Netflix, etc.), model a typical scenario using a suitable UML sequence diagram depicting the use-case where an OTT app user is interested to watch various items (news, sports, web-series, movies, etc.).
- f) Considering that you have been asked by DA-IICT placement committee to design a placement portal to accommodate relevant functionality needed by the placement committee, recruiting companies, students as well as faculty, model the implementation using a typical UML class diagram with suitable classes, attributes and methods along with its scope, multiplicities, and inter-class relationships for such a system.