Dhirubhai Ambani Institute of Information and Communication Technology (DA-IICT)
Gandhinagar, Gujarat.

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**

a) Compare gold platting vs. ivory tower as architecture design anti-patterns.
b) Summarise key lessons from the Browser war case study.
c) Define: sprint backlog, product backlog.
d) Ideal days and project velocity are two key indicators of any agile project. Summarise them to show their significance.
e) What do you understand by relationships like association, dependency, and generalization? How are they represented using respective notations in a typical UML class diagram?
f) How are terms actors, use-cases, system boundary, and scenarios relevant in the context of UML 2.x diagrams?
g) What aspects are generally considered during design of data and reference architectural models?
h) Depict using suitable diagram how agile methodology supports requirements/functionality changes.
i) Summarise different forms of OCL constraints.
j) Summarise the role of scrum master in software projects using agile methodologies.
k) 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.
l) How is typical daily scrum meeting conducted?
m) Summarise different message types along with their respective notations used in UML interaction models.
n) What do you understand by different abstractions of a class model? Summarize using a suitable example UML class diagram.
o) What are interactions occurrences and combined equivalent to when compared to typical programming constructs? Why are they used in sequence diagrams?
p) While using objects in an OO design using UML, what typical information generally gets referred to while citing objects in any software design model?

q) Summarise a typical template for textual use cases generally used in design documentation.
r) Summarise using suitable diagram elements of an activity model.
s) What are the various types of OCL collection types? Summarise.
t) 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 (UPSE, JEE, NEET, 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 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.