ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION **WINTER SEMESTER, 2019-2020**

DURATION: 1 Hour 30 Minutes **FULL MARKS: 75**

CSE 4513: Software Engineering and Object-Oriented Design

Programmable calculators are not allowed. Do not write anything on the question paper.

There are **4 (four)** questions. Answer any **3 (three)** of them.

Figures in the right margin indicate marks.

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1. a) Consider the following UML diagram. 4

Separate the following statements into those that are true and those that are false.

i. No two companies can have the same name
ii. No two employees can have the same name
iii. No two companies can be at the same address
iv. No two employees can work at the same address
v. Each employee works for at least one company
vi. No employees work for more than one company
vii. Each company has at least one employee
viii. Two employees with the same name cannot work for the same company

b) Below are the functional requirements of an elevator control system: 8+8

- The elevator control system shall allow the passenger to call the elevator and to select the destination floor.
- When the passenger pushes the external button (to call the elevator), or the internal button (to select the destination floor), the central control system switches the button light on.
- When the passenger calls the elevator or selects the destination floor, the central control system opens/closes the elevator door.
- When the passenger calls the elevator or selects the destination floor, the central control system moves/stops the elevator to/at the passenger call floor or to/at the passenger destination floor.
- When the passenger leaves the elevator, the central control system switches the button light off.

i. Draw the use case diagram for the above elevator control.
ii. Also describe the use case for "Select Floor".

c) What are the five principles of SOLID? What are the different principles of component cohesion and component coupling? 2+3

2. a) What are the four key values of agile development? How does product backlog differ from sprint backlog? 4+2

b) What questions must be answered by the developers involved in pair programming? 3

c) Describe various kinds of scrum events and artifacts. 8+8

3. a) To conduct an exam, an instructor first notifies the students about the exam date and the material to be covered. He then prepares the exam question (with sample solutions for the TAs), makes enough copies for the class, and hands it out to students on the designated time and location. The students write their answers to exam questions and hand in their papers to the instructor. The instructor then gives the exam papers to the TAs, along with sample solutions to each questions, and gets them to mark it. The instructor then records all marks and returns the papers to the students. 15

Draw a sequence diagram that represents the above scenario.

b) Assume, the velocity of your team is 50 story points. You have 20 user stories (US1-US20) in your project backlog. You have estimated the user stories to have a difficulty/complexity expressed in story points as follows: 4+4+2

- Each of US1 to US5 equals 3 story points
- Each of US6 to US10 equals 5 story points
- Each of US11 to US15 equals 8 story points
- Each of US16 to US20 equals 13 story points

i. If you have a team of 4 developers and weekly sprints (1 week = 5 days = 40 hours), which user stories would you be able to implement in the next sprint and achieve the highest possible value without violating your capacity (effort) constraint?

ii. How would your result change if the following needs to be implemented with highest priority?
   - US3 must be implemented together with US11
   - US7 must be implemented together with US16
   - US17 must be implemented together with US18

iii. What is the minimum number of sprints required to complete the project?

4 a) Describe the tools and techniques of requirement gathering. 8

b) What is usability? Describe the usability criteria those are used to evaluate user interface. 2+5

c) With proper example define functional and non-functional requirement of a software system. Mention four advantages and four disadvantages of prototyping. 6+4