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

MID SEMESTER EXAMINATION **WINTER SEMESTER, 2017-2018**

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) Briefly describe waterfall model. When can waterfall process model be more productive even over agile process models? 8+2

   b) Event management has become a very lucrative business now a days as organizations and individuals are outsourcing the management of their picnics, annual excursions, wedding receptions and miscellenious parties to event management companies. Suppose XYZ are running an event management business and they want a software to help them in their business. They told you about their business, now after hearing them: 7+8

      i. Can you elaborate the use case for booking an event/ party with XYZ?

      ii. Find out the domain classes and their basic relationships/ associations.

2. a) What are the planning activities you can think you when you plan for a software solution? Two of the planning principles are: 8
   - 'Planning is iterative' and
   - 'Plan based on what you know'

   Quote your experience in planning one of your projects and how you applied the two principles.

   b) Briefly describe how UML diagrams are used in agile process. 4

   c) Describe SCRUM agile development process. 8

   d) What is CRC? Quote a particular example of using CRC in any of your projects. 2+3

3. a) Change is difficult and costly to accommodate in typical software process model. Why? How does the agile process model accommodate change then? Show the cost savings of agile process using a chart/graph. 6

   b) Value Added Services (VAS) have become common in Cellular Data Network. Elaborate the VAS architecture? 8

   c) Describe the following aggregration and composition relationship given in Figure 1. 6

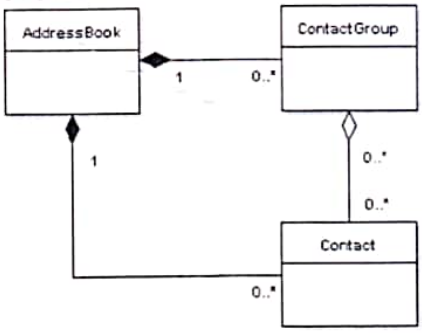

Figure 1.

   d) What are Continuous Integration (CI) and Test Driven Development (TDD)? 5

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4. a) What is a Software Requirement Specification (SRS)? What are the elements of a SRS. 3+4

   b) Draw an activity/ swim lane diagram to withdraw money from an ATM machine. 7

   c) Write a short note on sequence diagram. 4

   d) Noun becomes class and Verb becomes method. Discuss the analysis principle with a suitable example. Also discuss about the placement of the methods into the classes. 7

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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

B.Sc. Engg. / HD CSE 5th Semester

8 March 2018 (Afternoon)

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1. a) Define Software and Software Engineering. Draw and describe the failure curve of Hardware and Software. 3+3

   b) What is Legacy Software? Describe how the legacy software can turn into modern reusable software. 2+3

   c) What is Pareto Principle? Following table shows the number of faults found during testing phase of software. Using pareto principle, identify which errors need to be removed first in order to enhance the software quality. 3+7

Table 1: Table for question 1(c)

Error Name	Count
Input Field Exception Handling	130
Buffer overflow	60
Array Index Invalid	41
Improper Resource Allocation	39
Improper Branch Handling	19
Infinite Loops	7
Null Pointer Reference	85
Incompatible Types	5
Error initialization	94
Missing return type	2

   d) What are the two major requirements FURPS emphasize on? State the name of the quality attributes covered by FURPS. 2+2

2. a) Assume one of your software projects and describe the four major practices to follow in order to solve the problem. 8

   b) Assume, an online library management system. It provides an easy book management platform for the students, teachers and librarians. The librarian can add, delete, upload, issue books, add or remove teacher and student profiles etc. On the other hand, teacher and students can view, search and request for books. 10

   Given the scenario, identify the data entities of the system. Later, draw the Entity Relationship and Schema Diagram of the scenario.

   c) Describe the main roles and their expectations associated with Software Quality Management. 2

   d) "XYZ is a known software firm for its high quality software development strategy. The company has set standard rules for companywide project development. Besides, the company ensures high quality software by measuring the quality attributes regularly for enhanced 5

software performance." - Why and Which CMM level the company has achieved? What are the Key Process Areas (KPA), the company ensured for achieving this level?

3. a) "Consider a hotel management system used by hotel staffs and external users to book hotel rooms online. The system has also features like showing nearby visiting spots and travel details for ease of users". Given the scenario, draw the Architectural Context Diagram of the system. 5
   b) What is SCRUM? How can it help in adaptive software development? 5+2
   c) Identify and explain the Generalization, Aggregation and Composition relationships in the following diagram: 6

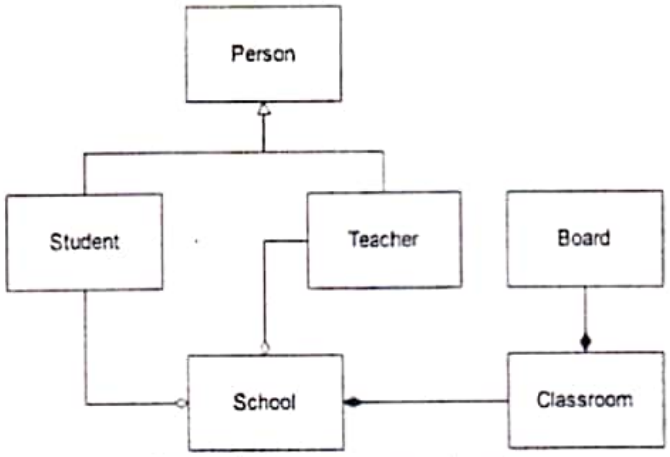

Figure 1: Diagram for question 3(c)

   d) Due to human misconception or information lack, defects get injected into the software system. Using which techniques, those injected defects could be removed? 7

4. a) Write short notes on - Reliability, Dormant Faults, Fishbone Diagram and Extreme programming. 6
   b) Identify and justify which process model will you follow for each of the following software development problems: 6
      i. An international insurance company wants to offer a huge number of insurance policies to its customers. The company requires a website where the customers can manage the insurance policies. The company also aims to provide multilingual support in future for the worldwide customers.
      ii. The railway organization wants to support online ticket management system with the existing pre-specified functionalities. The organization wants the development team to deliver the software incrementally within some specified number of meetings.
      iii. There is a need of a small app for transaction management offered by a specific bank. The app will be used by that specific bank only. However, the customer wants the app to be tested properly before its delivery.
   c) Demonstrate and draw the relationship among software error, faults and failures. 5
   d) An ATM system has some user accounts where the accounts are protected through account number and pin number. After two failed attempts to insert a pin, the account is locked. If a user enters the right pin number, the user is allowed to perform some transactions like - checking balance, withdrawing and depositing money. A user is allowed to withdraw money if enough money is available in the corresponding user account. 8
   Now, Identify the events and draw a single state diagram considering these events associated to an "ATMAccount" class.