Xi'an Jiaotong-Liverpool University
西交利物浦大學

Module Code	Examiner	Email of Examiner	Tel
CPT203			

1st SEMESTER 2023/24 RESIT EXAMINATION

Undergraduate – Year 3

Software Engineering 1

Exam Duration: 2 Hours

INSTRUCTIONS TO CANDIDATES

1、 **This is a closed-book examination, which is to be written without books or notes.**

2、 **Total marks available are 100.**

3、 **This exam consists of two sections:**

Section A consists of NINE questions for a total of 70 marks.

Section B consists of TWO systems modelling questions for a total of 30 marks.

Answer all questions. There is NO penalty for providing a wrong answer.

4、 **Onsite candidate should write the answer on the booklet(s) provided.**

5、 **Only English solutions are accepted.**

6、 **All materials must be returned to the exam supervisor upon completion of the exam. Failure to do so will be deemed academic misconduct and will be dealt with accordingly**.

Section A – Answer all questions below (70 marks):

Question A1
What are the main software process models? (3 marks)

Question A2
A team of students wants to develop a mobile app for reminding users about their classes. They currently have limited requirements for the system. Which software process model is the most suitable for this scenario? Please provide THREE justifications for your choice of process model. (7 marks)

Question A3
XJTLU's HR system requires IT software engineers to update their human resource system. Which software process model would be the most suitable for this scenario, and please provide your justification. (4 marks)

Question A4
A software engineering team has created a requirement specification for a mobile app that will replace the existing paper-based booking system at a sports center.
Which common techniques would you use to check and validate the specification? For each technique, briefly explain the tasks involved in ensuring the quality of this product. (9 marks)

Question A5
A game company intends to develop an innovative game that collects brain signals, analyzes them, and utilizes them to influence certain activities within the game.
5.1 Please outline and explain three types of information that software engineers need to discuss with both the game company and the end users during the process of Requirements Elicitation and Analysis. (6 marks)

5.2 There are two levels of details in requirements. Can you please briefly explain what they are? (6 marks)

Question A6

Consider the following classes in a bookstore application: -

- Book: Represent a book with details such as title and author.
- Order: Represent the order with order line items.
- Review: Represent the book review enter by the customer.

The following are the interaction between the above classes: -

- The Order class retrieves the title of the book from the Book class when generating a receipt.
- The Review class checks the title of the book from the Book class before posting a review.

Suggest an approach to reduce the coupling in this system. (4 marks)

Question A7

Apart from coupling, could you please list and explain four design concepts that you have learned in the class? (8 mark).

Question A8

Below is the code for a simple `Calculator` class that provides methods to perform basic arithmetic operations.

```
public class Calculator {
    public int add(int a, int b) {
        return a + b;
    }
    public int subtract(int a, int b) {
        return a - b;
    }
    public int multiply(int a, int b) {
        return a * b;
    }
    public int divide(int a, int b) {
        if (b == 0) {
            throw new ArithmeticException("Division by zero");
        }
        return a / b;
    }
}
```

8.1 Please create JUnit test cases to verify the accuracy of the divide method in the `Calculator` class. Make sure to include a test for the edge case where the denominator is equal to 0. (6 marks)

8.2 What are the lifecycle annotations in JUnit and in what order are they executed? (5 marks)

Question A9

Can you please define Risk Management and provide explanations along with examples for the three categories of risks? (12 marks)

Section B – Answer all requirements modeling questions below (30 marks):

Question B.1 (15 marks)

An order processing system in a company works as follow: (15 marks)

- Once a new order is received, the clerk initiates the order processing.
- First, the clerk receives the order and validates it to ensure that all necessary information is present. If any required information is missing, the order will be rejected and the process will terminate immediately.
- If the order is valid, the clerk will proceed to the second step, which is to register the order.
- After the order is registered, the subsequent processes will run simultaneously in two different departments.
    - Logistic department
        - The logistic department will pack the registered order.
        - If the order has a high priority, it will be delivered using express delivery.
        - Otherwise, it will be delivered using regular delivery.
    - Finance department
        - The finance department sends an invoice to the customer according to the registered order.
- Upon receiving the invoice from the finance department, the customer will make payment to them.
- Once the finance department receives payment from the customer, they update the payment records accordingly.
- The finance department will close the order once payment is received and the logistics department has delivered the order.
- The process terminates after the order is closed.

Draw an Activity Diagram with Swimlanes to model the above process.

Question B.2 (15 marks)

The task is to develop a Sequence Diagram to illustrate the interactions involved when a tourist enrolls for a city sightseeing tour. The process begins with the tourist accessing a Tour Catalog to explore the available tours. Since tours have limited seats, the tourist selects a specific tour from the catalog and proceeds to make an Enrollment, but there is no guarantee of success. The enrollment process should include a check for seat availability, allowing the tourist to enroll only if there are seats available for the chosen tour. To keep the tourists informed, the system should provide the enrollment status.

The end of the paper