2021-2022 FINAL

Question A.1 (12 marks)

List and explain FOUR principles that guide software engineering practice. (12 marks)

Question A.2 (12 marks)

i.   Explain the term, non-functional requirement. (3 marks)

ii.   Explain why a non-functional requirement is often considered to be more critical than a functional requirement. (3 marks)

iii.   State TWO distinct non-functional requirements for the availability of the ticket vending machine. (2 marks)

iv.   A common problem with non-functional requirements is that system users often propose these requirements as general goals, such as "*The system should be easy to use by staff and should organize in such a way that user errors are kept to a minimum.*". Re-write the non-functional requirement to improve its testability. (4 marks)
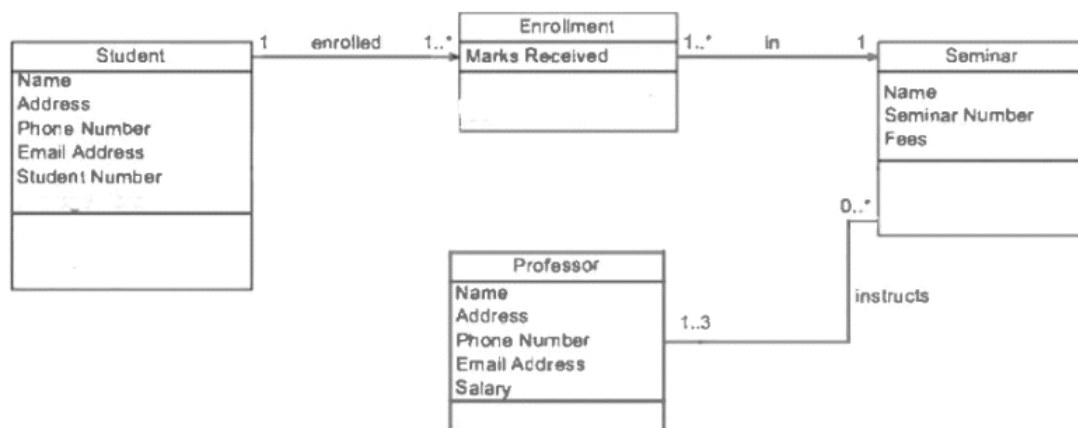
Question A.3 (12 marks)

List FOUR software design model elements, and give a brief description for each of them. (12 marks)

Question A.4 (9 marks)

i.   Explain the term 'Cohesion' and 'Coupling'. (4 marks)

ii.   Consider the following class diagram of a sub-system for a university. The stakeholde have requested several operations to include in the system, as listed in the table below. R draw the class diagram to include the operations listed in the table. Your new class diagra must exhibit highly cohesive classes. (5 marks)

Operation	Description
Enroll seminar	Enroll a student in the seminar
Get average mark	Calculate and return the average mark for the student
Get final mark	Calculate and return the final mark for the student
Add student	Add student for a seminar
Drop student	Drop student for a seminar

Suppose you have the following Calculator class which you want to test.

```java
public class Calculator {
    public int multiply(int a, int b) {
        return a * b;
    }
}
```

Fill up the following test class to complete the testing for the above Calculator class. Additiona requirements are: - (10 marks)

- Use 4* 5 = 20 as the test case
- The test should run 5 times
- Make use of all imported classes.

```java
import static org.junit.jupiter.api.Assertions;
import org.junit.jupiter.api.BeforeEach;
import org.junit.jupiter.api.DisplayName;
import org.junit.jupiter.api.RepeatedTest;
import org.junit.jupiter.api.Test;

class CalculatorTest {
...
    void setUp() {
        ...
    }
    void testMultiply() {
        ...
    }
}
}
```

屏幕剪辑的捕获时间: 2022/12/29 14:35

Section B – Answer all questions (45 marks):

Question B.1

Pack-and-Go is a company that operates an online tour reservation system. The company is growing fast. Its management is planning to phase out the old system. They are looking forward to a more efficient system. Our challenge is to design and implement a new system that not only meets the company's immediate needs but also is flexible enough to support other types of products in the future. Below is the description of the main activities that need to be supported by the new system: -

- The Create Reservation activity starts when a customer selects a tour package. Creating a new reservation involves selecting a tour package and tour date, adding tourists and contact information, and finally accepting payment for the reservation. The website only accepts an online payment that will involve the online payment gateway company.
- The Maintain Reservation activity starts when a reservation is modified in any way by a customer. It handles all aspects of the reservation modification, and it ends when the customer completes the reservation modification session.
- The Receipt Issuing activity is started by a clerk whenever a tour completes. It handles all aspects of receipt issuing, including the downloading of digital receipts by the customer. The status of the issuing of receipt for each reservation has to report to the accounting system.
- The Maintain Relationships activity is started by a customer service clerk, who is a special type of clerk, whenever a relationship with a customer requires special attention. It handles all aspects of Pack-and-Go's relationships with customers, and it ends when a relationship is either created or maintained for a customer.
- The Decision Support activity is started by a manager whenever a predefined or undefined request for information is made. It handles all aspects of decision support effort, and it ends when a reply is formulated for the inquiry.

Draw a Use Case Diagram for the online tour reservation system. (15 marks)

You're creating a digital pet program. What happens to the pet when it receives different stimuli are determined by the state it's in. You decide to model the digital pet with a state machine diagram.

The behavior of the digital pet program is as follows:
- When the pet is turned on, it starts out happy
- If the pet is happy and receives punishment, then it becomes sad
- If the pet is happy and receives praise, it stays happy
- If the pet is happy and being ignored (no punishment nor praise) for more than 30 minutes, he will become sad
- If the pet is sad and receives praise, it becomes happy
- If the pet is sad and receives punishment, it becomes heart-broken
- The pet will remain heart-broken no matter what you do (either punishment or praise)
- You can turn off the pet at any state

Identify the states, actions, and transitions of the digital pet and draw a state machine diagram. (15 marks)

Question B.3

A hotel room reservation system works as below: -

- When a customer requests a room, the hotel employee looks for room availability.
- If there is no room available, the process will end.
- If there are rooms available, the employee will select a room.
- After a room is selected, the employee will enter the customer's credit card information for verification.
- While waiting for the credit card approval, the employee will enter the customer details.
- If the credit card verification fails, the room reservation process will terminate.
- Only if the credit card verification pass and the customer's details are entered, the employee can finally confirm the room reservation.

Draw an Activity Diagram to document the above system. (15 marks)