SEMESTER 2
2021-2022

CS335FZ
Software Engineering & Software Process

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Time allowed: 2 hours

Answer at least ***three*** questions
Your mark will be based on your best ***three*** answers

All questions carry equal marks

Instructions

	Yes	**No**
Log Books Allowed		X
Formula Tables Allowed		X
Other Allowed (*enter details)*		X

General (*enter detail)*

QUESTION 1 (20 marks)

(a) From a software architecture point of view, explain the differences between a ***prototype***, ***proof-of-concept*** and ***skeleton implementation***. (6 marks)

(b) Explain the meaning of "***Customer collaboration over contract negotiation***" in Agile software development. (4 marks)

(c) Draw a class diagram from the following code fragements. (10 marks)

```
package cn.fzu.miec.doc;
public class Report {
  private String title;

  public Report(String title) {
    this.title = title;
  }

  public String getTitle() {
    return title;
  }
}
```

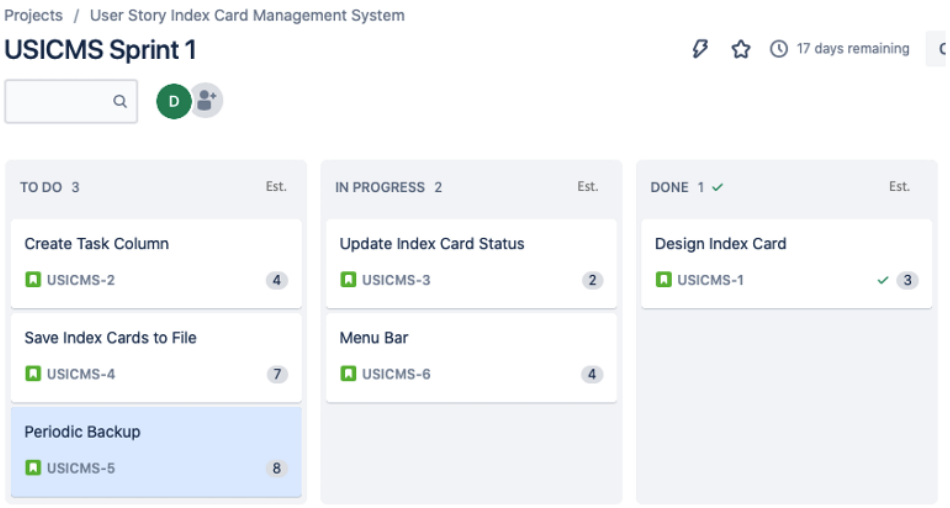
```
package cn.fzu.miec.device;
import cn.fzu.miec.doc;
public class Printer {
    public void print(Report report) {
    System.out.println(report.getTitle());
  }
}
```

```
package cn.fzu.miec.device;
import cn.fzu.miec.doc;
public class HPPrinter extends Printer {

}
```

QUESTION 2 (20 marks)

(a) In Scrum, a Burndown chart is frequently used for monitoring the development progress within a Sprint. Given a 4-week Sprint development and the Sprint status as shown in the figure below, draw a Burndown chart for the Sprint. (8 marks)



(b) An automated ticket-issuing terminal system for rail tickets is being designed. The system works as follows. When a user presses the start button, a list of destinations is displayed (the user can also search for destinations). Once a destination has been selected, users are requested to provide their personal identifier. After its validity is checked, the user is then asked to insert a credit card to the machine. When the credit transaction has been validated, the ticket is issued.

(i) Based on the application scenario, identify four main use cases and three main actors of the system. (7 marks)

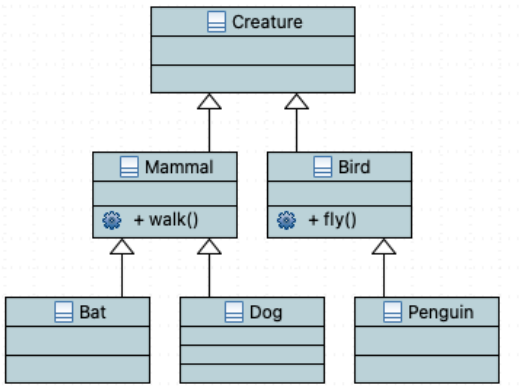
(ii) Draw a Use Case diagram to illustrate the interactions between the actors and use cases identified. (5 marks)

QUESTION 3 (20 marks)

(a) Briefly discuss when a singleton design pattern should be used in an object-oriented software. (2 marks)

(b) Explain what is meant by ***measurable*** non-functional requirement, as used in Requirements Engineering? How to write an effective measurable non-functional requirement? (8 marks)

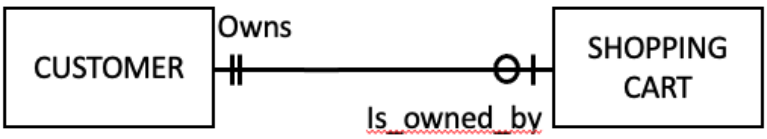
(c) In Object-Oriented design, modeling complex relationships between entities is hard. The following class diagram models *creatures* using inheritance. It is technically correct, but logically incorrect, as a bat is a mammal but can fly, and a penguin is a bird, but cannot fly. Redesign the class diagram using class composition so that it is logically and technically correct. (10 marks)



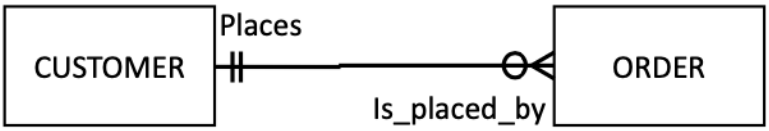
QUESTION 4 (20 marks)

(a) In structured analysis, explain what the following E-R models indicate?

(i) (2 marks)



(ii) (2 marks)



(b) State the main differences between Integration Testing and System Testing. Explain why conducing system tests is important for large enterprise software systems. (6 marks)

(c) Given a project schedule as shown in the table below, build the activity network for the project schedule and identify the critical path in the activity network. (10 marks)

Task	Duration	Dependencies
T1	7	
T2	12	
T3	16	T1
T4	9	
T5	10	T2, T4
T6	5	T1, T2
T7	17	T1
T8	26	T3, T6
T9	14	T5, T7
T10	10	T9