FACULTY OF SCIENCE

Academy of Computer Science and Software Engineering

Module	**IFM3A10 / IFM03A3** Informatics 3A – Introduction to Software Engineering
Campus	APK
SSA Examination	July 2016

Date	July 2016	**Time**	TBA
Assessors		Mr F F Blauw	
Internal Moderator		Dr W S Leung	
External Moderator		Mrs C Schroder (NMMU)	
Duration	180 minutes	**Marks**	150

The question paper consists of 5 pages

Instructions:
- Answer all questions.
- Please write neatly and legibly.
- Do not write in pencil.
- Ensure that all diagrams are neatly drawn.
- Unless otherwise stated, diagrams do not constitute complete answers.
- Calculators may not be used.

SupraClean

dirt and dust to clear and clean

You have been tasked to develop a system for a cleaning company.

The *cleanmaster* needs to manage her agents. She needs to know who her cleaners are and details about them.

The duster manager needs to know exactly what and how many dusters is currently in storage and how many are currently being used.

The vacuum manager also needs to know exactly which vacuum is being used.

When a cleaner goes on assignment, the *cleanmaster* needs to know which cleaner is currently on assignment. The cleaner also needs to know the status of their assignment.

When a cleaner returns from assignment, they need to log a report, but they also need to return all dusters and vacuums to their respective departments. Finally, during the reporting, the cleaner needs to log how many dust mites were killed, if any.

The system will be called SupraClean.

QUESTION 1

Answer the following questions.

    1.1. Provide a definition for Software Engineering. (3)

    1.2. Explain why ethics is important as a Software Engineer. Consider examples. (7)

    1.3. A software engineer needs to be in tune with the human aspects of their industry. An effective engineer needs to cultivate various traits within themselves. What traits and attributes does a software engineer need to effectively work with the humans around them? (5)

[15]

QUESTION 2

Pressman & Maxim (2015) defines the seven tasks for requirements engineering.

    2.1. Briefly discuss these seven tasks of requirements engineering with specific focus on their relation with one another. (10)

    2.2. One of the steps in the requirements engineering process is negotiation. Considering SupraClean, are there any requirements that you think should be changed? If so, why? (3)

    2.3. Discuss one consideration when eliciting requirements from stakeholders and its impact on stated requirements. (2)

[15]

QUESTION 3

3.1. Considering SupraClean, draw a Use Case diagram describing the requirements elicited.   (15)

3.2. Draw an Activity Diagram for the "Complete Assignment" use case.   (10)

[25]

QUESTION 4

Pressman & Maxim (2015) defines the five tasks for a software engineering model as:

1. Communication
2. Planning
3. Modelling
4. Construction
5. Deployment

4.1. Using diagrams to aid you in your written discussion, discuss these activities in context of the following two prescriptive models:
- Waterfall model
- Incremental model   (10)

4.2. In the context of financial implications, compare the advantages and disadvantages of these two prescriptive models. Make reference to SupraClean in your discussion   (10)

[20]

QUESTION 5

Consider the agile development model.

5.1. Making reference to the activities in the agile method, discuss how they relate to one another in the context of the order of their execution.   (10)

5.2. For SupraClean, would you consider changing from a prescriptive model to an agile process model? Why? Are there any considerations?   (5)

[15]

QUESTION 6

6.1. Considering SupraClean, which generic architectural style will you base your design on?   (1)

6.2. Using a diagram to discuss this style. Make reference to the SupraClean system.   (5)

6.3. Discuss a consideration that needs to be taken into account when choosing an architectural style.   (4)

6.4. Do design principles with regard to webapp and mobile app design differ from that of "traditional" systems; or are they similar? Discuss you answer.   (10)

[20]

QUESTION 7

7.1. Architects use blueprints, composers use sheet music, and software engineers can use UML. Briefly discuss UML, its uses, as well as principles that should be considered when using UML. (5)

7.2. Consider the following code. Draw an Interaction Sequence Diagram to model the code. You may assume that the "Program" automatically calls Main. (15)

```csharp
class Program
{
    public static void Main()
    {
        bool super;
        // input from user to get value for "super"
        Cleaner me = new Cleaner();
        Assignment myAssignment = new Assignment(me);
        myAssignment.GetVacuum(super);
        myAssignment.Execute();
    }
}
class Assignment
{
    private Cleaner _mainCleaner;
    private Vacuum assignmentVacuum;
    public Assignment (Cleaner mainCleaner)
    {
        _mainCleaner = mainCleaner;
    }

    public void GetVacuum(bool superStrength)
    {
        assignmentVacuum = new Vacuum(superStrength);
    }

    public void Execute() {
        _mainCleaner.Dispatch(assignmentVacuum);
    }
}
class Cleaner
{
    public void Dispatch(Vacuum assignmentVacuum) {
        assignmentVacuum.Go();
    }
}
class Vacuum
{
    private bool _needsSuperStrength;
    public Vacuum(bool superStrength) {
        _needsSuperStrength = superStrength;
    }
    public void Go()
    {
        if (_needsSuperStrength)
                System.Console.WriteLine("VOOM VOOM VOOM BRRRR");
        else
                System.Console.WriteLine("voom.");
    }
}
```

[25]

QUESTION 8

8.1. Discuss the relation between the following design concepts:

- Abstraction
- Information Hiding (4)

8.2. One important design concept is that of functional independence. However, designing with this in mind can lead to further design issues, particularly when we consider the concepts of "Modularity" and "Separation of Concerns". Discuss one such issue. Is there a way around it? (4)

8.3. During design it should be kept in mind that the design should be of a certain quality. Over time, several design attributes have come to light. Briefly discuss two (2) of these design attributes and how they relate to one another. (7)

[15]

QUESTION 9

This year so far has seen a lot when it comes to user's privacy. Here we can cite examples such as the FBI vs Apple case as well as the WhatsApp End-to-End encryption. What do you think the future holds for privacy and security in the information technology sphere?

[5]

— END OF EXAM —

Grand Total: [150]