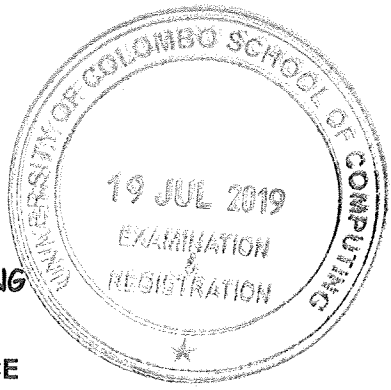
ANSWER SCRIPT

157

UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING



BACHELOR OF SCIENCE HONOURS IN COMPUTER SCIENCE

Academic Year 2017/2018 – Second Year Examination – Semester I – 2019

SCS2203 – Software Engineering III

TWO (2) HOURS

To be completed by the candidate

Examination Index No: .....

Important Instructions to candidates:

1. The medium of instruction and questions is **English**.
2. If a page or a part of this question paper is not printed, please inform the supervisor immediately.
3. Note that questions appear on both sides of the paper.
   If a page is not printed, please inform the supervisor immediately.
4. Write your index number on each and every page of the answer paper.
5. This paper has **4** questions and **16** pages.
6. Answer **ALL** questions. All questions carry equal marks
   (**25** marks).
7. Any electronic device capable of storing and retrieving text including electronic dictionaries and mobile phones are not allowed.
8. **Non-Programmable/Programmable** calculators are **not allowed**.

For Examiner's use only	
Question No	**Marks**
1	
2	
3	
4	
Total	

1. Software Engineering projects can be categorized as Evolutionary Projects, Greenfield Projects and Framework-based Projects.

(a). Briefly explain these **three** terms **[6 Marks]**

(b). Briefly explain the difference between the terms "Re-engineering" and "Refactoring".

[4 Marks]

(c). Rational Unified Process (RUP) is an iterative and incremental software development process framework.

i. Rational Unified Process contains four phases and "Inception" and "Elaboration" are its first two phases. Name and briefly explain the **third** and **fourth** phases of the Rational Unified Process. **[6 Marks]**

ii. Define the term "Artifact" in relation to the Rational Unified Process (RUP). **[3 Marks]**

(d). Briefly explain **three** differences between "Service-Oriented Architecture" and "Microservices" architecture. **[6 Marks]**

2.

(a) "When an architect designs the architecture for a system, he/she has to consider about the quality attribute trade-offs." Justify this statement. **[5 Marks]**

(b) Explain what an "Architectural Strategy" is. **[5 Marks]**

(c) "Patterns implement multiple tactics". Explain this statement using an example. **[5 Marks]**

(d) Explain what Design Patterns are? **[2 Marks]**

(e) List the **four** components of a design pattern? **[2 Marks]**

(f) Explain **two** types of design patterns **[2 Marks]**

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(g) What is the design pattern that will be used to add new functionality to an existing object?

[2 Marks]

(h) When can a Factory pattern be used?

[2 Marks]

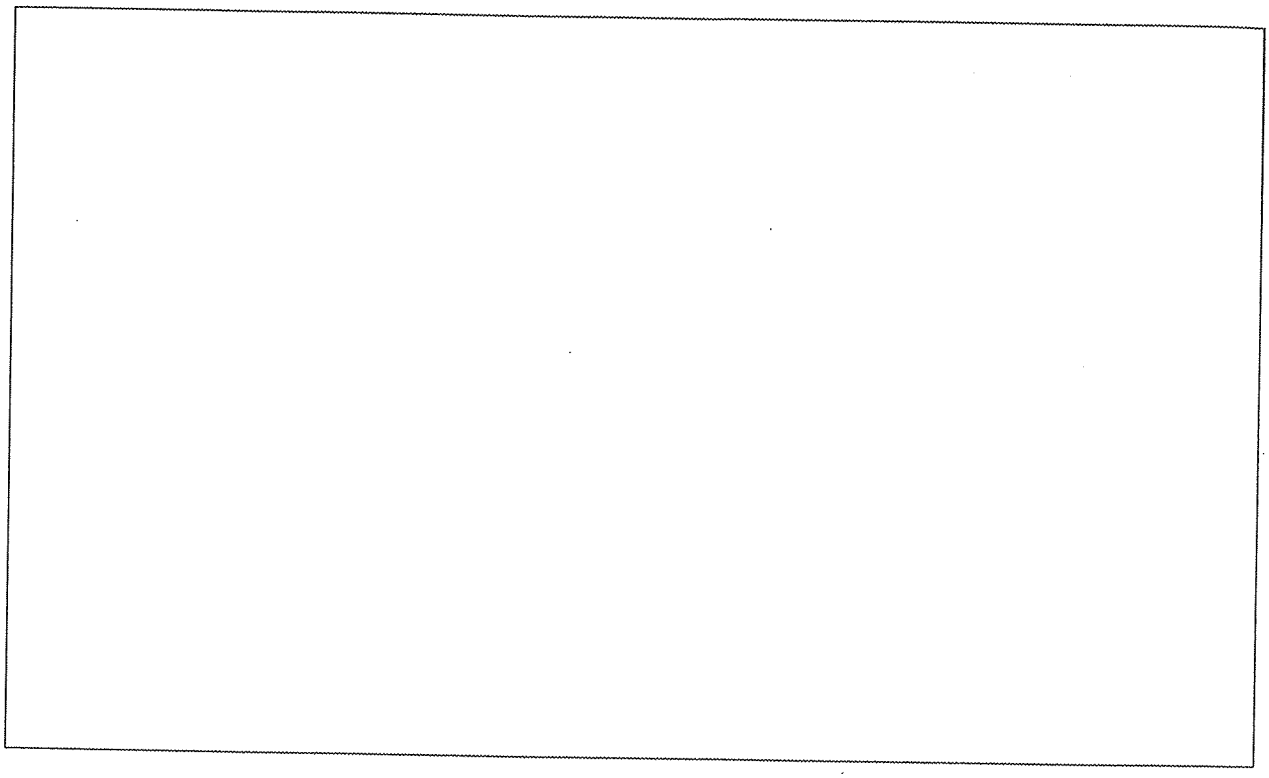
3. Following is a case study for a Virtual Learning Environment (VLE). In answering the questions below, state clearly the assumptions you make for each part of the question.

Note: The quality tactic frameworks and general scenarios are given separately on the last page

The University of Neverland uses a Virtual Learning Environment to manage their learning contents and control the delivery of learning materials. The administrators can create catalogues and match learners or groups of learners to courses. A user management module allows administrators to control access of users by assigning them specific access roles. Teachers can create assessments, grade them and keep track of their students. Students can collaborate with each other using tools, such as email, wikis, discussion boards, and chats. Students can connect to the VLE from any student computer laboratory when they are on-campus. Students have to use a special VPN (Virtual Private Network) provided by the university to access the VLE when they are off campus.

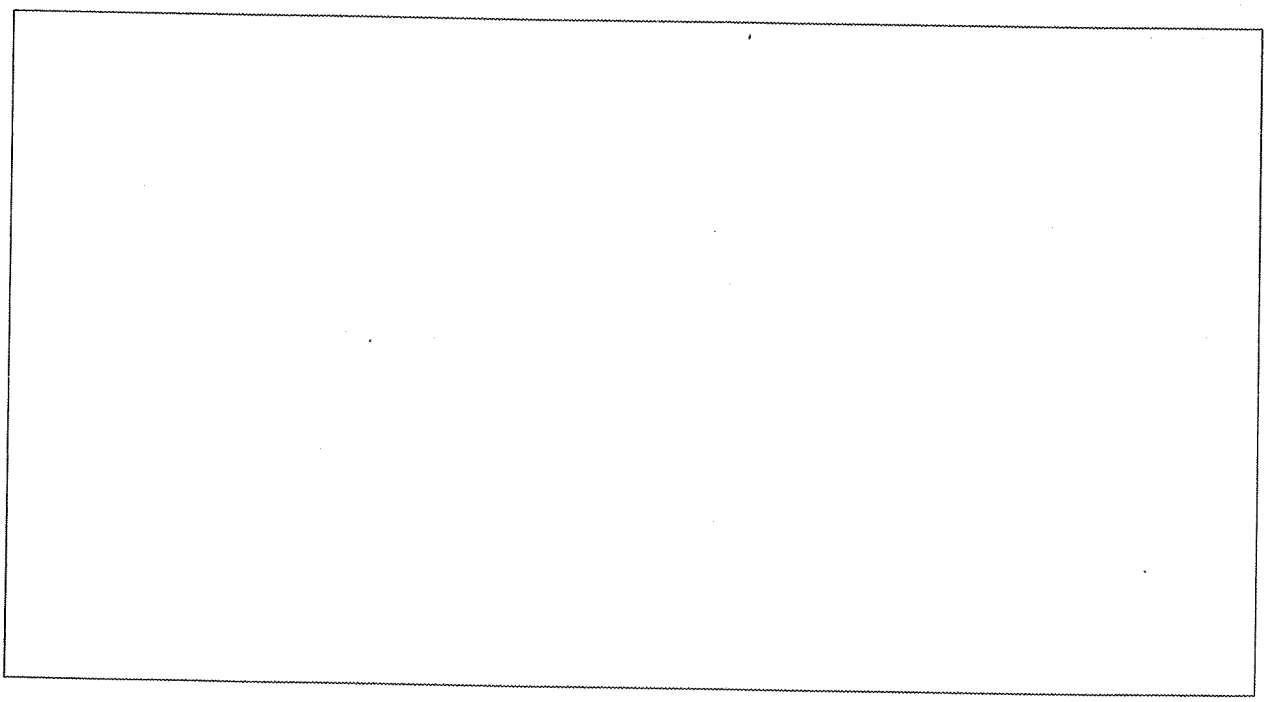
(a) List **four** different types of stakeholders of VLE. **[4 Marks]**

(b) Select **three** of the stakeholders that you have identified and name **two** of the most important quality attribute for each of the stakeholders with **justifications.** **[6 marks]**

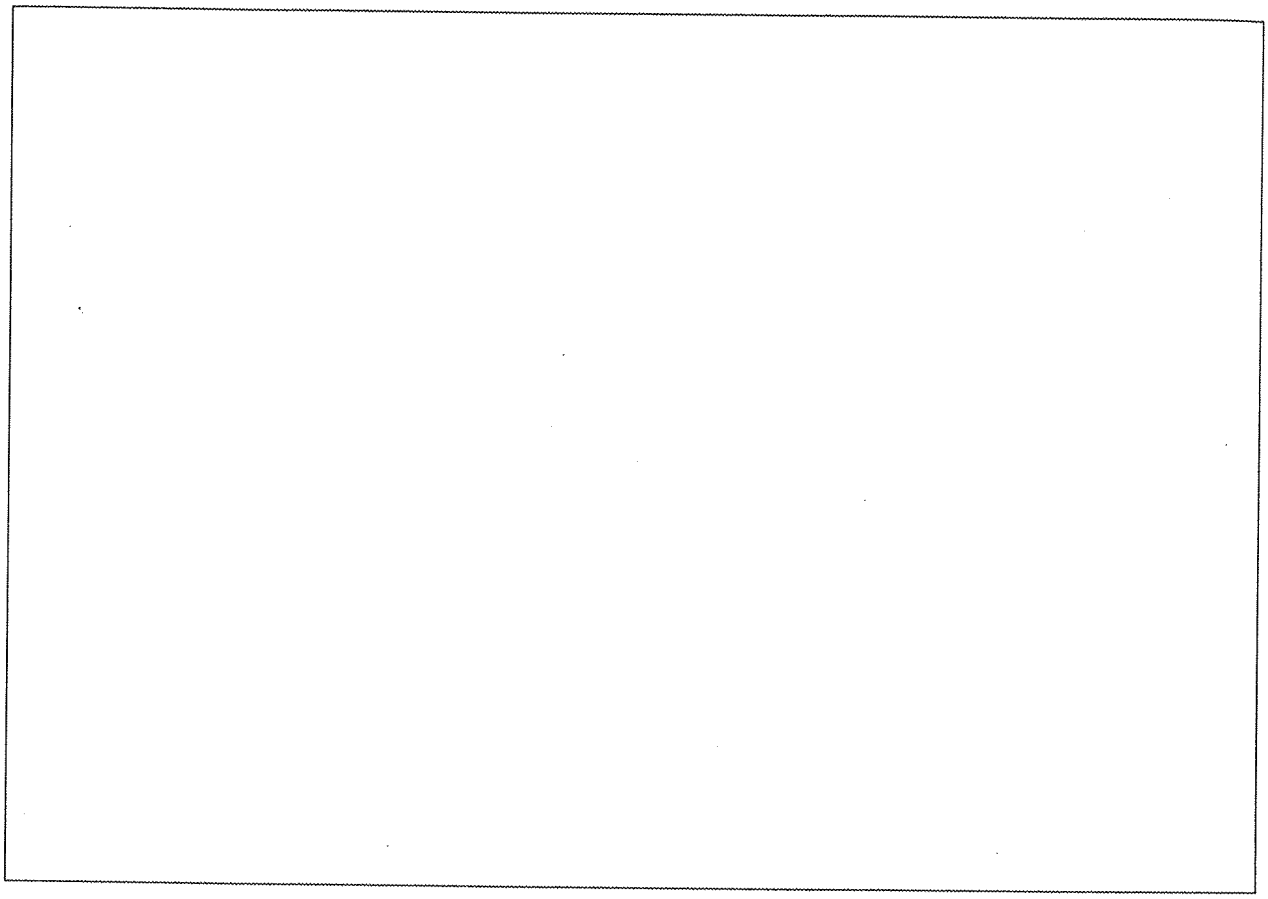


(c) Write a concrete quality attribute scenario for Security of VLE based on the general quality attribute framework.

[5 Marks]

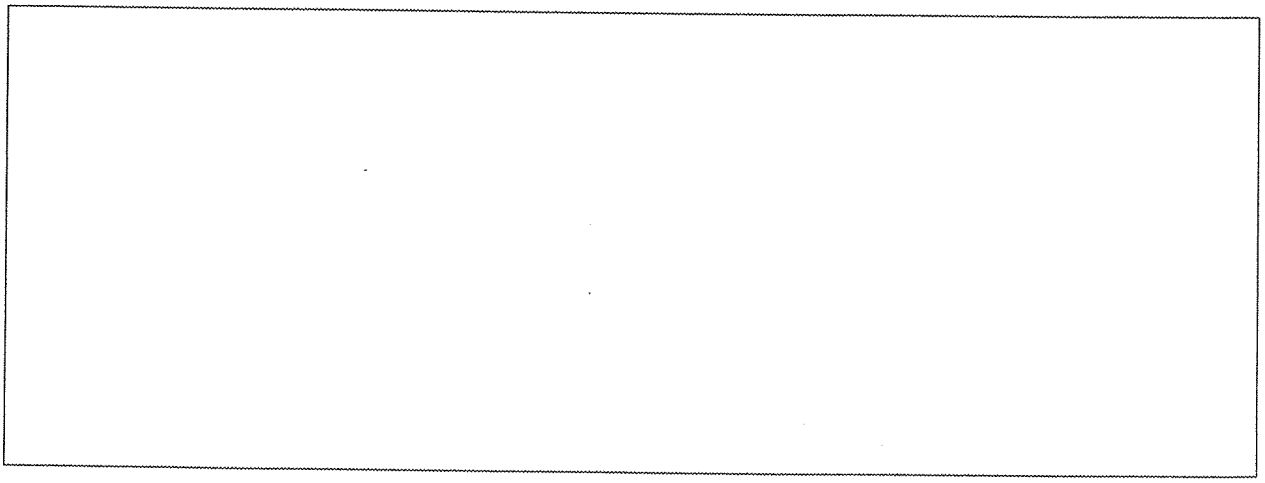


(d) Based on the security tactics framework, explain **two** important tactics you are going to use to achieve the concrete quality attribute scenario described in **part c**. **[10 Marks]**



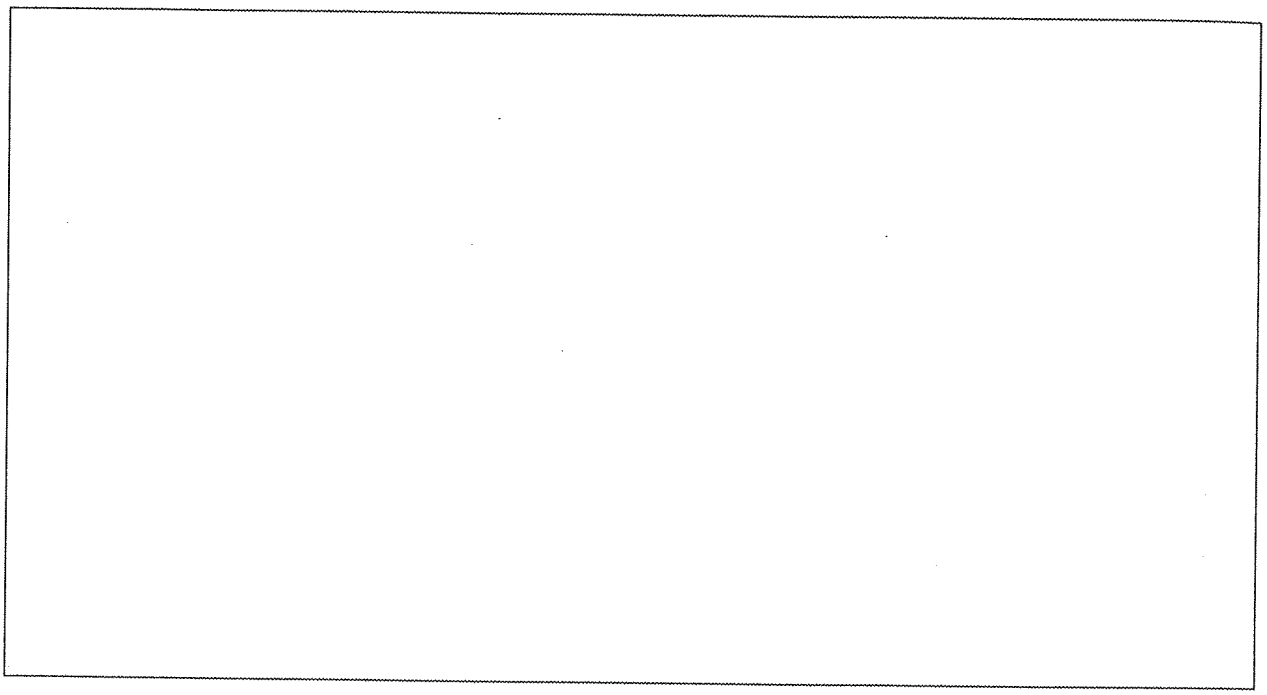
4. The following questions are based on Agile- SCRUM methodology

   a) Compare and contrast SCRUM methodology over the traditional software development methodologies such as Iterative Waterfall using **at least four** aspects. **[4 Marks]**

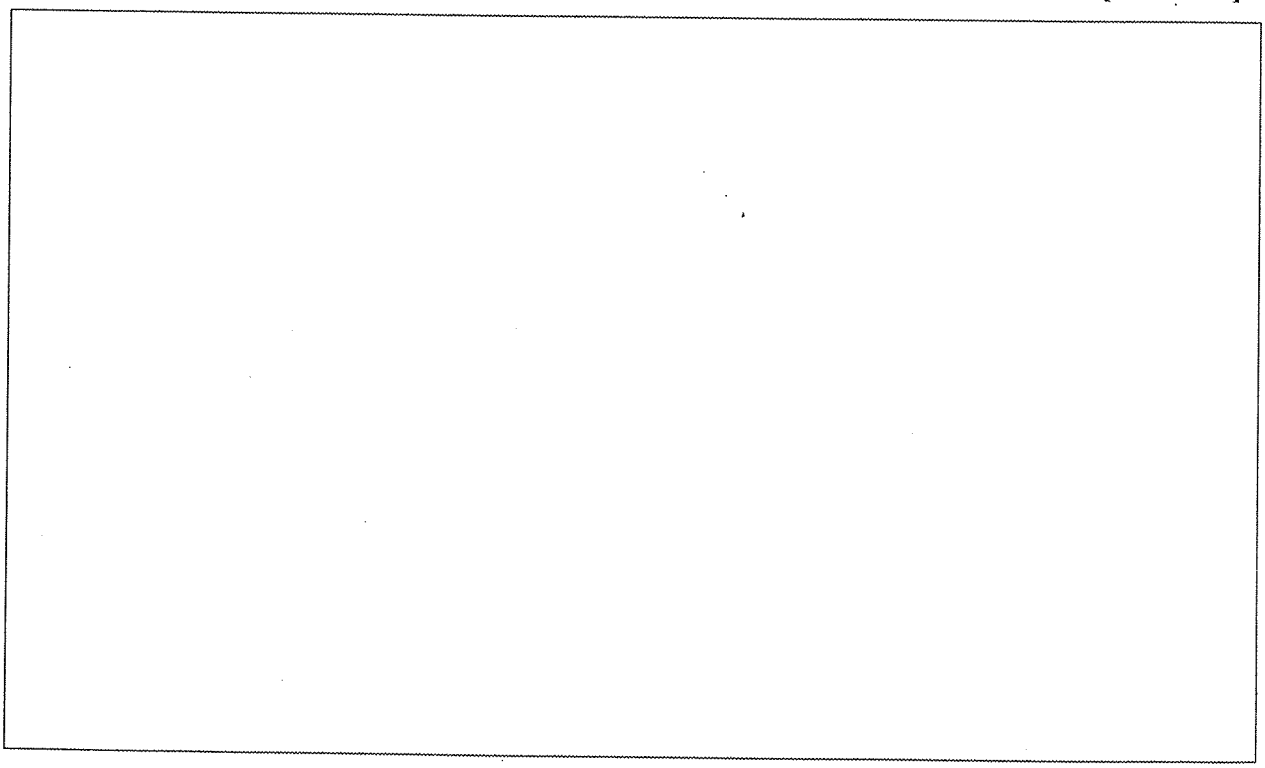


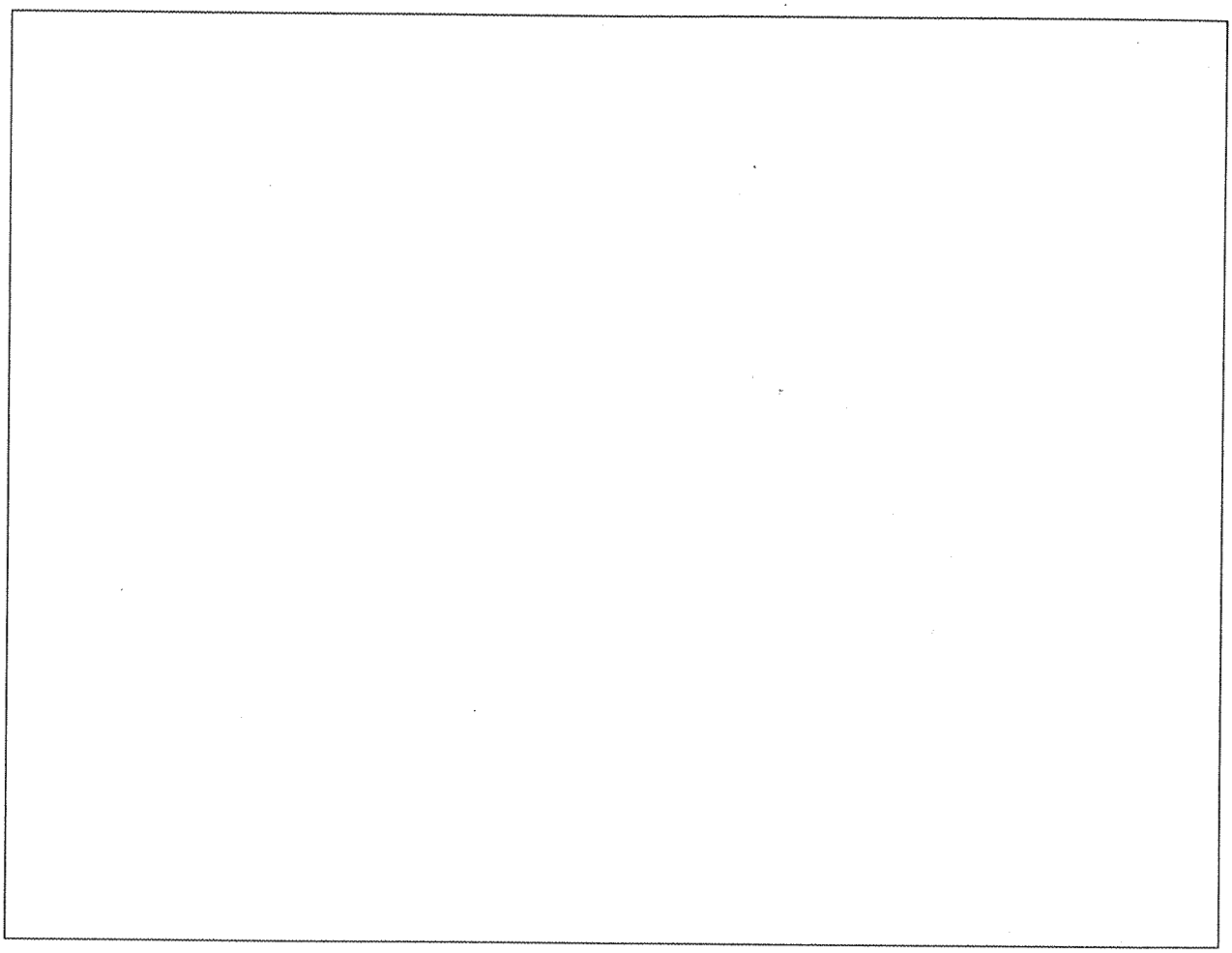
b) Briefly describe the **three** pillars of Scrum methodology using a diagram. **[6 Marks]**

c) Briefly explain the difference between product backlog and Sprint backlog **[5 Marks]**



d) Describe the responsibilities of a Scrum Master **[10 Marks]**





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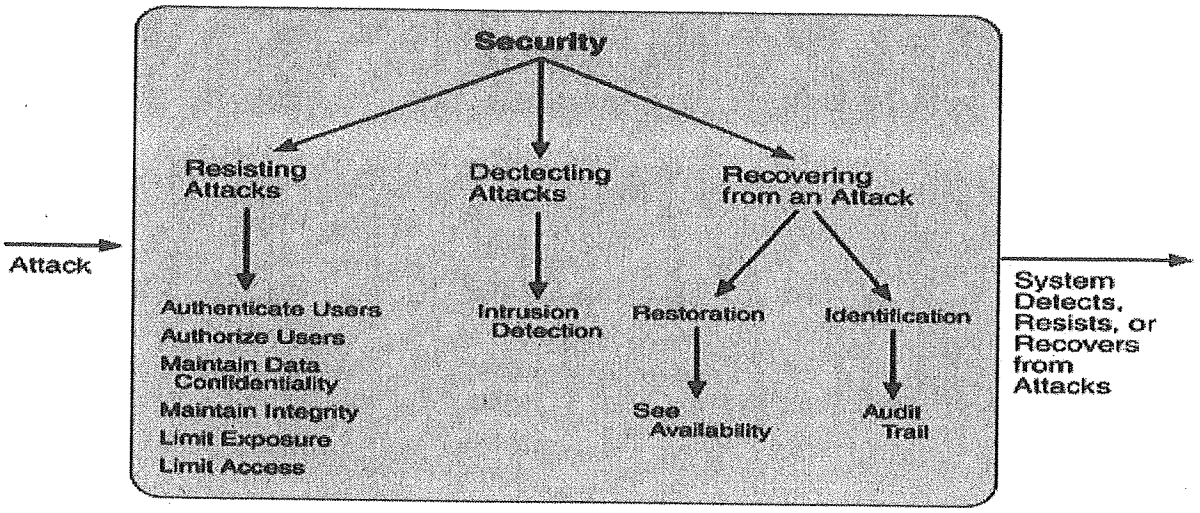

Portion of Scenario	Possible Values
Source	Human or system that is correctly identified, identified incorrectly, of unknown identity who is internal/external, authorized/ not authorized with access to limited resources
Stimulus	**Unauthorized** person Tries to display data, change/delete data, access system services, reduce availability to system services (an attack or an attempt to beak security)
Artifact	System services; data within system
Environment	Either online or offline, connected or disconnected from a network, firewalled or open network
Response	Authenticates user; hides identity of the user; blocks access to data and/or services; allows access to data and/or services; grants or withdraws permission to access data and/or services; records access/modifications or attempts to access/modify data/services by identity; stores data in an unreadable format; recognizes an unexplainable high demand for services, and informs a user or another system, and restricts availability of Services
Response Measure	Time/effort/resources required to circumvent security measures with probability of success; probability of detecting attack; probability of identifying individual responsible for attack or access/modification of data and/or services; percentage of services still available under denial-of-services attack; restore data/services; extent to which data/services damaged and/or legitimate access denied