UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)

Academic Year 2021 – 2nd Year Examination – Semester 4

IT4406 – Agile Software Development

Part 2 - Structured Question Paper

(ONE HOUR)

To be completed by the candidate

BIT Examination Index No: .....

Important Instructions:

- The duration of the paper is **1 (one) hour**.
- The medium of instruction and questions is English.
- This paper has **2 questions** and **14 pages**.
- **Answer all questions.** All questions carry **equal** marks.
- **Write your answers** in English using the space provided **in this question paper**.
- Do not tear off any part of this answer book.
- Under no circumstances may this book, used or unused, be removed from the Examination Hall by a candidate.
- Note that questions appear on both sides of the paper.
  If a page is not printed, please inform the supervisor immediately.
- Calculators are **not** allowed.
- *All Rights Reserved.*

Questions Answered

Indicate by a cross (×), (e.g. [X]) the numbers of the questions answered.

	Question numbers		
To be completed by the candidate by marking a cross (×).	1	2	
To be completed by the examiners:			

1) (a) (i) Agile development focuses on achieving three types of success, Name **two (2)** and briefly explain the importance of achieving them.

(8 marks)

ANSWER IN THIS BOX

personal success - Without personal success troubles motivating yourself and employees.

technical success - Without technical success source code will eventually collapse under its own weight.

organizational success - Without organizational success team may find that they're no longer wanted in the company

(ii) *Manage Flow* is one of the core properties of *Kanban*, list **two (2)** other core properties of *Kanban*.

(2 marks)

ANSWER IN THIS BOX

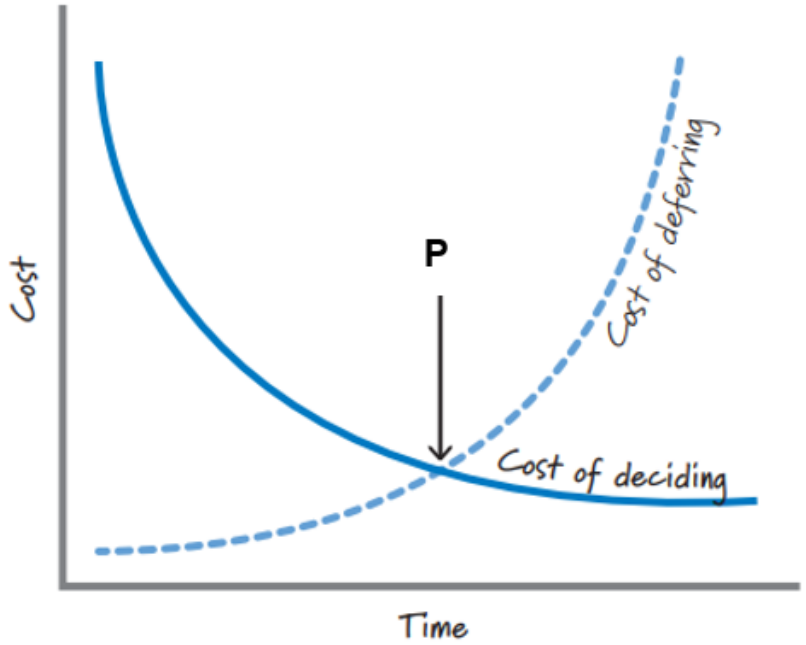
Visualise the workflow

Limit Work In Process (WIP)

Make Process Policies Explicit

Improve Collaboratively

1) (b) (i) Answer the following questions based on the given graph.



A. Identify the most suitable term to replace the label **P**.

(2 marks)

ANSWER IN THIS BOX

Last economically responsible moment

B. Interpret the given graph with respect to the decision making in agile development.

(4 marks)

ANSWER IN THIS BOX

Scrum contends that we should never make a premature decision just because a generic process would dictate that now is the appointed time to make one. Instead, in Scrum, we favor a strategy of keeping our options open. Often this principle is referred to as the last responsible moment (LRM), meaning that we delay commitment and do not make important and irreversible decisions until the last responsible moment. The above graph shows the responsible moment when the **cost of not making a decision becomes greater than the cost of making a decision**

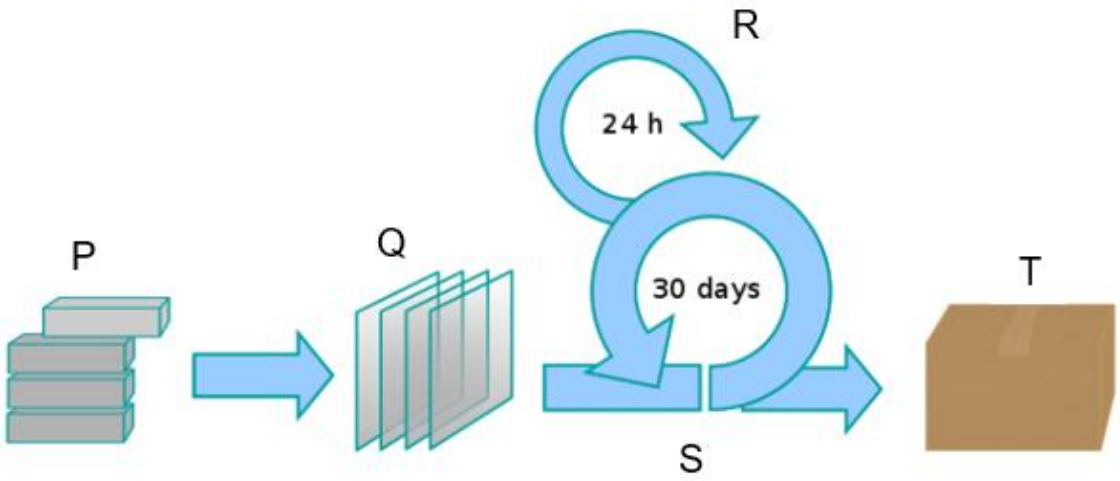
(ii) Indicate whether the following sentences relate to *Agile* or *Plan driven* approaches.
(3 marks)

A. Always consider the cost of delay.
B. Focus on idle work, not idle workers.
C. Quality comes at the end, after a broad test-and-fix phase.

ANSWER IN THIS BOX
A: Agile
B: Agile
C: Plan driven

1) (c) The following questions are related to core concepts in Scrum framework.

(i) The following diagram shows the high-level structure of the Scrum framework, Identify the most suitable terms to replace the labels from **P, Q, R, S** and **T**.
(5 marks)



ANSWER IN THIS BOX
P: Product backlog
Q: Sprint backlog
R: Daily stand-up meeting
S: Sprint
T: Shippable product / Finished work

(ii) Under the first step of the release planning conduct in Pre-game, requirements are broken into *Epics* and *User Stories*. Briefly explain the difference between Epics and User Stories.

(4 marks)

ANSWER IN THIS BOX

Epics -

Epics are large user stories. Typically, ones that are too big to implement in a single iteration Need to be disaggregated into smaller user stories at some point

User Stories -

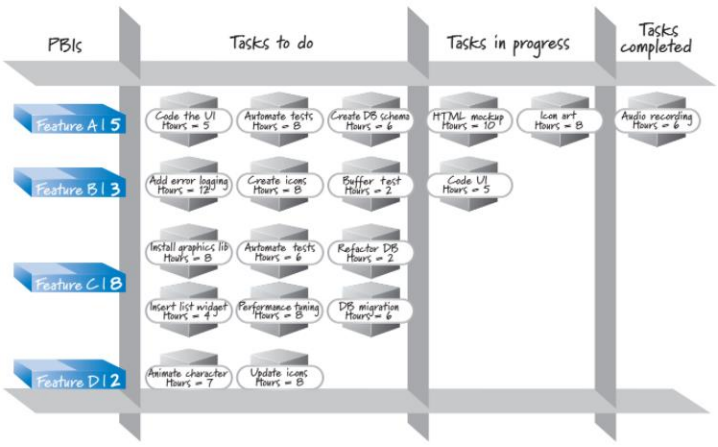
Write in the voice of the customer, very slim and high-level requirements artifacts

(iii) *Task board* and *burn down charts* used to visually communicate the sprint progress by the Scrum teams**.** Briefly explain **one (1)** of them using a suitable illustration**.**

(8 marks)

ANSWER IN THIS BOX

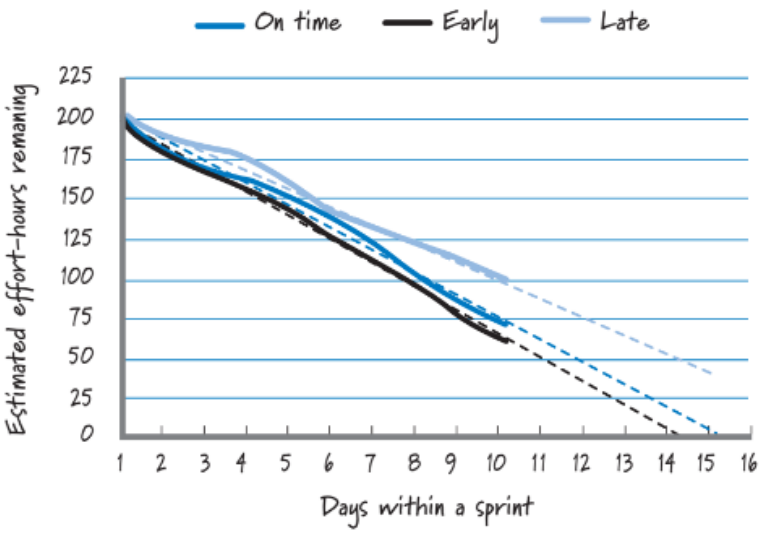
Taskboard shows the evolving state of the sprint backlog overtime on the task board each product backlog item planned to be worked on during the sprint is shown with the set of tasks necessary to get the item done. All tasks initially start off in the “to do” column. Once the team determines that it is appropriate to work on an item, team members start selecting tasks in the “to do” column for the item and move them into the “in progress” column to indicate that work on those tasks has begun. When a task is completed, it is moved to the “completed” column. A team may choose to put other columns on its task board if it thinks that visualizing the flow of work through other states is helpful. In fact, an alternative agile approach called Kanban uses just such a detailed board to visualize the flow of work through its various stages.

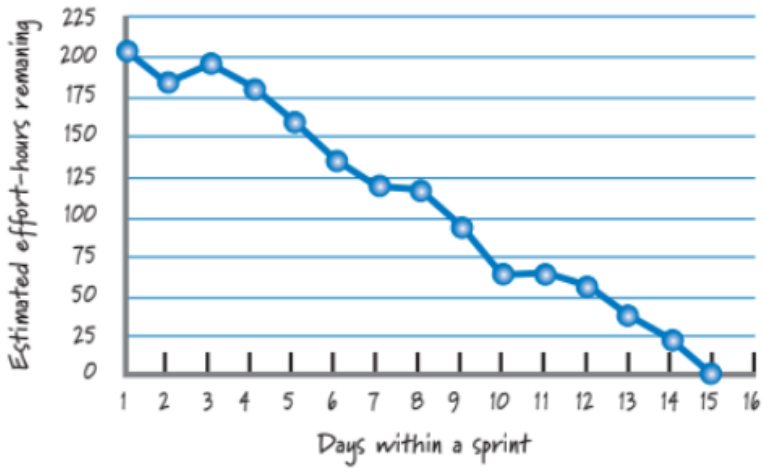


In sprint **burndown charts** the vertical axis numbers are the estimated effort-hours remaining, and the horizontal axis numbers are days within a sprint. Each day we update this chart to show the total estimated effort remaining across all of the uncompleted tasks.
Sprint burndown charts are useful for tracking progress and can also be used as a leading indicator to predict when work will be completed. At any point in time, we could compute a trend line based on historical data and use that trend line to see when we are likely to finish if the current pace and scope remain constant. By projecting the trend lines, we have another important set of data that adds to our knowledge of how we are managing flow within our sprint.

trend line,

- intersects the horizontal axis close to the end of the sprint duration, we can infer that we're in reasonable shape ("On time").
- lands significantly to the left, we should probably take a look to see if we can safely take on additional work ("Early").
- lands significantly to the right ("Late"), that raises a flag that we're not proceeding at the expected pace or that we've taken on too much work (or both!). When that happens, we should dig deeper to see what's behind the data and what, if anything, needs to be done.





1) (d) The following questions are related to Scrum roles,

(i) Scrum teams are made up of three Scrum roles**:** *Product Owner***,** *Scrum Master***,** *and Development Team.*
State **two (2)** main responsibilities of each role mentioned above.

(6 marks)

ANSWER IN THIS BOX
Product Owner:
Manage economics, Collaborate with the development team, Participate in planning,
Groom the product backlog, Collaborate with the stakeholders
Define acceptance criteria and verify that they are met, Any other relevant
Scrum Master:
Be a facilitator, Remove obstacles faced by the team
Assist the team in achieving the iteration goals
Coach the team ad product owner on SCRUM principles, Any other relevant
Development Team:
Perform Sprint Execution, Inspect and Adapt Each Day
Groom the Product Backlog, Inspect and Adapt the Product and Process
Any other relevant

(ii) *Self-organizing* and *Cross-functionally diverse* are two characteristics of the development teams in the Scrum. Briefly explain those characteristics with respect to development teams.

(8 marks)

ANSWER IN THIS BOX
Self-organizing:
Team members self-organize to determine the best way to accomplish the sprint goal.
There is no project manager or other manager who tells the team how to do its
work (and a ScrumMaster should never presume to). Self-organization is a bottom-up,
emergent property of the system- there is no external dominating force applying
traditional top-down, command-and-control management.

Cross-functionally diverse:

Development team members should be cross-functionally diverse; collectively they should possess the necessary and sufficient set of skills to get the job done.

A cross-functionally diverse team has members from different backgrounds(coding, designing, testing). Each team member brings a set of cognitive tools for problem solving; these tools can involve different interpretations (of the same data), different strategies (or heuristics) for solving problems, different mental models of how things work, and different preferences for both approaches and solutions.

This kind of diversity typically leads to better outcomes in terms of faster solutions, higher-quality deliverables, and greater innovation, all of which translate into greater economic value.

Having a good mix of senior- and junior-level personnel on the same team will lead promotes a healthy, collaborative learning environment

2) (a) (i) *Correctly Managing the Planning Inventory is one of the key principles in Scrum planning.*

List **two (2)** other key principles of *Scrum Planning*.

(4 marks)

ANSWER IN THIS BOX

Don't assume we can get the plans right up front

Up-front planning should be helpful without being excessive

Keep planning options open until the last responsible moment

Focus more on adapting and preplanning than on conforming to a plan

Favor smaller and more frequent releases

Plan to learn fast and pivot when necessary

(ii) List **three (3)** forms of waste that could be generated by creating a large inventory of predictive, not-yet-validated planning artifacts.

(6 marks)

ANSWER IN THIS BOX

Wasted effort to produce the parts of the plan

Waste of having to update the plan

Wasted opportunity of not having invested time in more valuable activities

2) (b) *When developing a product with Scrum, planning takes place at multiple levels.*

(i) Briefly describe the goal of the *Product Planning (Envisioning)* level**.**

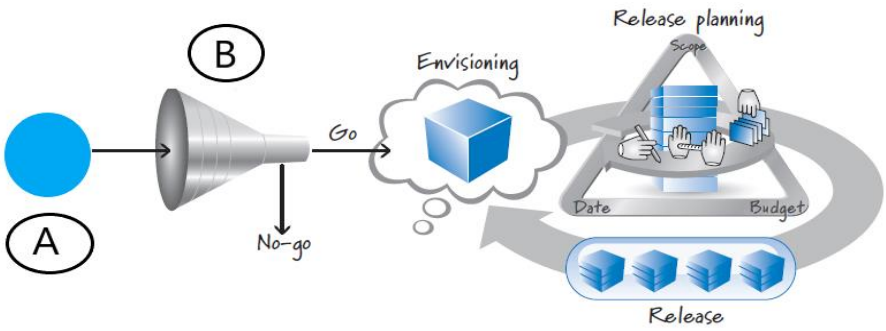
(2 mark)

ANSWER IN THIS BOX

The goal is to work upon an idea, describing the essence of the potential product and creating a rough plan for how to approach its creation.

(ii) *Envisioning is an ongoing task as shown in the figure below.*

Identify the phases labelled as **A** and **B**.



Source : Essential Scrum, A Practical Guide to the Most Popular Agile Process by Kenneth S. Rubin

(2 mark)

ANSWER IN THIS BOX

A - Idea

B - Strategic filter

(iii) Briefly describe what takes place in the phase labelled **B.**

(4 marks)

ANSWER IN THIS BOX

Product idea is first passed through the organization's strategic filter to determine if it is consistent with the organization's strategic direction and therefore worthy of deeper investigation and investment.

(iv) List **three (3)** outputs of *Product Planning*.

(6 marks)

ANSWER IN THIS BOX

Product vision

Product backlog

Product roadmap

2) (c) (i) *Sprint planning relies on a set of inputs that guide the development team in determining what value it can realistically deliver by the end of the sprint.*

List **four (4)** inputs of the *Sprint Planning* process and briefly describe each.

(8 marks)

ANSWER IN THIS BOX

Product backlog: Prior to sprint planning, the topmost product backlog items have been groomed into a ready state.

Team velocity: The team's historical velocity is an indicator of how much work is practical for the team to complete in a sprint.

Constraints: Business or technical constraints that could materially affect what the team can deliver are identified

Team capabilities: Capabilities take into account which people are on the team, what skills each team member has, and how available each person will be in the upcoming sprint.

Initial sprint goal: This is the business goal the product owner would like to see accomplished during the sprint.

(ii) *When we are determining the development team's capacity to work on product backlog items, we have to consider factors such as the time team members would spend attending to other projects.*

List **two (2)** more factors that would affect the development team's *capacity*.

(4 marks)

ANSWER IN THIS BOX

The team needs to reserve time to assist the product owner with product backlog grooming.

Team's other office work that is unrelated to the current sprint.

Team members' taking personal time-off

(iii) *In Scrum there are two 'Inspect and Adapt' events at the end of each Sprint.*

Name those **two (2)** *Inspect and Adapt* events and briefly describe **one (1)**.

(4 marks)

ANSWER IN THIS BOX

1. Sprint Review
2. Sprint Retrospective

Sprint Review

Focuses on the product and reviews the results from the sprint. The Scrum team , Internal stakeholders , Other internal teams and external stakeholders take part in this. The outputs of the sprint review are a groomed product backlog and an updated release plan.

Usually in the review,

- Provides a summary of what has and has not been accomplished
- A demonstration of the increment
- Discuss the current state of the product, and adapting the future product direction.

Sprint Retrospective

A sprint retrospective can be as simple as the Scrum team members coming together to discuss

questions such as:

- What worked well this sprint that we want to continue doing?
- What didn't work well this sprint that we should stop doing?
- What should we start doing or improve?

And the full scrum team takes part in this activity.

2) (d) (i) Briefly describe **two (2)** advantages of using *Agile Quality Assurance* measures.

(4 marks)

ANSWER IN THIS BOX

Every development artifact is tested

Checking the program codes, diagrams, design documents through task board and Backlog.

Corrective measure takes place as early as possible

In a scenario where the automated test case fails, if possible the responsible programmer rectifies the code immediately. Otherwise a solution is given in the current sprint. If the problem continues to exist, creating a solution will be added to the product backlog.

Constructive QA tools

Clean Code, test automation, test first are some techniques used within the development process. Members of the team practise their own standards to increase the quality of the product

Process improvements are made from the bottom up

According to the needs of the team, immediate actions are taken.

(ii) *All the tests that a developer applies on his/her code is known as "developer testing" or "unit testing". Some unit tests use "test doubles".*

What are *test doubles*?

(2 mark)

ANSWER IN THIS BOX

Test doubles are placeholders used to replace dependencies when there are unavailable components at the time of testing.

(iii) State **two (2)** types of *test doubles*.

(4 marks)

ANSWER IN THIS BOX

Stub

Spy

Mock

Fake

Dummy

*****