Birla Institute of Technology & Science, Pilani
Work Integrated Learning Programmes Division
First Semester 2023-2024

Comprehensive Examination
(EC-3 Regular)

Course No.	: SE ZG 544
Course Title	: Agile Software Processes
Nature of Exam	: Open Book
Pattern of Exam	: Typed Only
Weightage	: 40%
Duration	: 2 ½ Hours
Date of Exam	: 25/11/2023 (AN)

No. of Pages = 6
No. of Questions = 6

Note to Students:
1. Please follow all the *Instructions to Candidates* given on the cover page of the answer book.
2. All parts of a question should be answered consecutively. Each answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Q.1 Set. (A) [4+4]

Q. 1.1 Imagine you're responsible for a critical project. Can you outline the key performance indicators (KPIs) you would establish as a customer, team member, or management member to ensure project success? Describe the significance of these KPIs and provide insights into how they would be instrumental in improving project performance in various contexts.

Q. 1.2 Considering the need for regular performance assessment, can you suggest instances where it's crucial to measure different aspects of a project or product multiple times a day, on a daily basis, or at the end of each iteration? Share your insights into the specific measures you would recommend for each frequency and explain the purposes behind these measurement intervals.

Q.1 Set. (B) [4+4]

Q. 1.1 In Agile practices, how do you see the alignment between the choice of measures for a software project and the frequency of collecting these measures supporting the core Agile principles? Can you provide examples of how these choices reflect Agile principles in action?

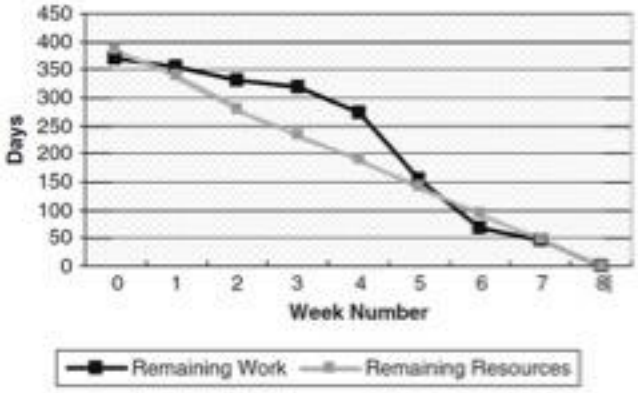
Q. 1.2 When a team is new to Agile and lacks historical data, and they are experimenting with continuous integration, what factors should they consider when selecting the following four key progress measures for their project? How can these measures effectively guide their Agile adoption, even in the absence of historical data?

- Presenting information about the total work performed.
- Quality of work performed so far.
- The work progress pace (Continuous Integration-pulse).
- The status of the remaining work versus the remaining human resources.

Q.1 Set. (C) [4+4]

Q. 1.1 Analyze the burn-down chart for a team's release. Identify potential reasons for any gaps between remaining work and remaining resources from week 2 to week 4.

What actions could be taken to address this situation? Additionally, what might explain the complete depletion of resources at the start of week 8, and how would you recommend dealing with this scenario?



Q. 1.2 When it comes to Agile planning, please outline a specific team goal. Then, propose measures that could assist the team in achieving this goal. Describe how these measures can inform the team's decision-making process and contribute to their progress toward achieving the stated objective.

Q.2 Set. (A) How do short iterations in Agile development align with constructivist principles to facilitate learning and knowledge building? Share six advantages of short iterations that directly support constructivism and improve the team's learning process. [6]

Q.2 Set. (B) In Agile software development, there are various practices aimed at supporting the learning processes of Agile teams and software product customers. Please list and briefly describe six of these practices, emphasizing how they encourage a culture of continuous learning and adaptation [6]

Q.2 Set. (C) Reflect on your experience in Agile project development. Can you provide a specific instance when you had to modify your project procedures due to fresh insights obtained during the process? Share the details of the situation, including the reasons that led to the procedure change, the steps taken to make these adjustments, and the outcomes or consequences of these modifications for the project. [6]

Q.3 Set. (A) [3+3]

Q. 3.1 Within the Agile framework, there are various characteristics, roles, principles, practices, values, and artifacts. Which of these characteristics is often considered the cornerstone or foundation upon which the others are built?

Q. 3.2 Agile philosophy is built on following five fundamental tenets:

- Redefined Roles
- No “Big Upfront” Design
- Promotes Iterative Development
- Emphasizes limited and negotiated functionalities.
- Underscore the importance of Quality through testing

Can you provide a concise interpretation of these tenets and explain how you perceive their significance within the Agile context? Share your insights.

Q.3 Set. (B) [3+3]

Q. 3.1 Let's explore the alignment between some principles and the "Official" Agile Principles. Can you match the following principles to the appropriate "Official" Agile Principles and briefly explain the connections?

Principles:

- Develop minimal software. Produce minimal functionality.
- Produce only the product requested.
- Develop only code and tests.
- Accept change.
- Put the customer at the center.
- Treat tests as a key resource.

Q. 3.2 Agile methodologies often emphasize flexibility and collaboration, but why do planning, documentation, project contracts, methodology, and tools still hold significance within an Agile team's workflow?

Q.3 Set. (C) [3+3]

Q. 3.1 In the context of developing successive subsystems or clusters for a future product, each centered around technology layers: Persistence (database) cluster, networking cluster, business logic cluster, and user interface cluster).
How does the Agile concept of iterative development apply? Discuss the differences it introduces compared to traditional, non-iterative approaches to software development.

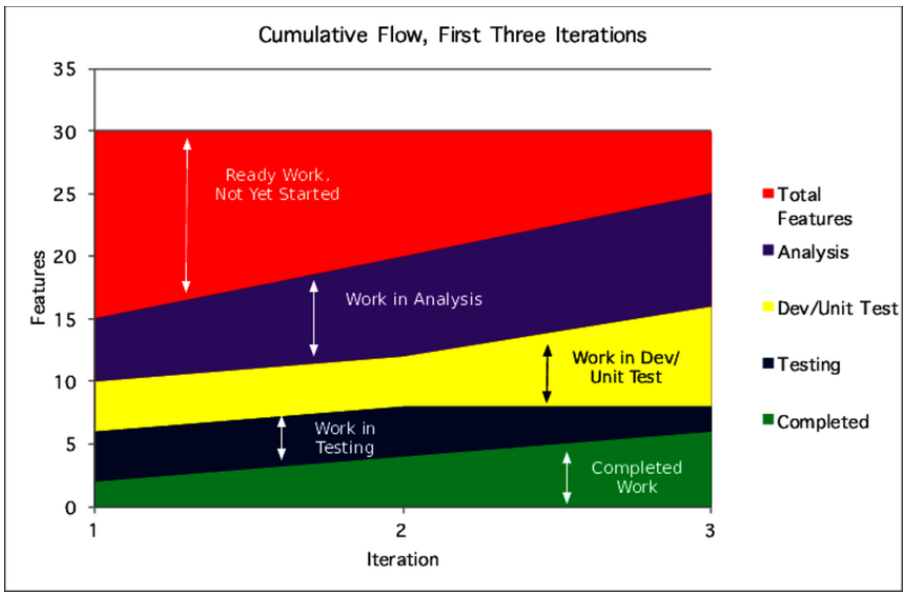
Q. 3.2 Risk analysis involves the identification of hazards and the associated risks that can impact a project. Can you identify potential risks that may arise in your project related to the following categories:

- Technical hazards.
- Planning hazards.
- Personnel hazards.
- Client hazards.

Q.4 Set. (A) [4+2]

Q. 4.1 The Agile team is employing a Scrum strategy built on the concept of flow, and you have access to their cumulative flow chart after three iterations. Based on this cumulative chart, illustrate how the Kanban board might appear at the beginning of Iteration-2 and at the conclusion of Iteration-3. Provide an estimate of the number of "in progress" features and the number of features that have been completed for each of these two points in time, based on the cumulative flow data.

Q. 4.2 Additionally, at the conclusion of each iteration, what is the target or expected number of "in Progress" features that the team should ideally have, based on their Agile methodology and practices?



Q.4 Set. (B) [3+3]

Q. 4.1 For the launch of a product, can you provide examples of release criteria based on the following scenarios:

- Performance
- Scalability
- Reliability

Q. 4.2 When considering release frequencies for various product types, what would be the typical release schedule for the following:

- Boxed Software
- Digital-only products such as Social media sites or Software as a Service products
- Software with Hardware or mechanical components
- Products with firmware

Q.4 Set. (C) [3+3]

Q. 4.1 How can an Agile approach be used to develop a database schema and login/security for a product with various reports for different users? Share how Agile principles can guide incremental development of these features while maintaining flexibility and responsiveness to user needs.

Q. 4.2 Looking at the user story "As an already registered user, I want to download my bank statement so I can see if my budget is on track," can you describe a couple of dependent user stories that this primary story assumes or leads to?

Q.5 Set. (A) [4+4]

Q. 5.1 In the context of decision-making and feedback, let's consider two options for purchasing a two-digit lottery ticket. In the first scenario, you can buy a random two-digit number for $1, and in the second scenario, you can purchase the first digit for 50 cents, receive feedback, and then choose to buy the second digit for 50 cents if the first one is correct. Calculate the chances (in %) of winning and losing in both

scenarios. Additionally, explain how the feedback mechanism in the second scenario can aid in making better decisions and potentially lead to a net gain.

Q. 5.2 You have three technical paths to choose from, each involving an investment cost of $15,000. The success probabilities and potential savings for each path are as follows:
Path A: 50% chance of success, resulting in a $100,000 savings.
Path B: 90% chance of success, resulting in a $20,000 savings.
Path C: 100% chance of success, with a $16,000 savings.
To account for variability and risks, calculate the expected monetary value (EMV) for each path, where EMV is calculated as the probability of success multiplied by the impact. Which of these paths represents the best economic alternative based on your EMV calculations?

Q.5 Set. (B) [4+4]

Q. 5.1 In Agile development, the benefits of strengthening safety and trust in the team often become apparent during sprint execution. Can you describe three specific Agile strategies in detail that enable team members to collaborate effectively to complete valuable user stories while also advancing the product as a whole?

Q. 5.2 For each of the Agile techniques you've described in the previous question, please elaborate on the advantages they provide to the team.

Q.5 Set. (C) [4+4]

Q. 5.1 Velocity estimation is a crucial aspect of Agile project planning. Please list and explain three different approaches for estimating velocity. Then, describe how each of these approaches can be applied to the following team scenarios:

Team 1: Existing team with known technology.
Team 2: Existing team with unknown technology.
Team 3: New team with known technology.
Team 4: New team with unknown technology.
Highlight the suitability and potential challenges of each approach in these different team contexts.

Q. 5.2 In the metaphor of a regular car journey where you plan to travel 1000 miles over two weeks, with a daily target of 100 miles, and you have tools like a visual direction indicator, an odometer, a speedometer, and a map, can you draw parallels between these elements and specific aspects of the Scrum framework? Explain how the visual direction indicator, odometer, speedometer, and map can symbolize or represent Scrum concepts, roles, or artifacts, and how they contribute to successful project management within Scrum.

Q.6 Set. (A) [4+2]

Q. 6.1 In the context of deliverables, "working software" is often associated with software products, and "detailed documentation" might accompany various other deliverables. For each of the following types of deliverables, identify the equivalent of "working software" and "detailed documentation":

- Software Product
- Marketing campaign
- Book
- Home design

- Cake
- Presentation

Q. 6.2 Describe what these equivalents mean for each type of deliverable and how they help customers or stakeholders assess the deliverable's quality and alignment with their objectives.

Q.6 Set. (B) [3+3]

Q. 6.1 In the context of breaking down a large project plan into successive two-week portions with the aim of obtaining feedback, is it accurate to suggest that this team is working in sprints? If they choose to work in sprints, what are some Agile guiding principles that the team should adhere to effectively implement this iterative and incremental development approach?

Q. 6.2 What does the Satir Change Model entail, and can it be effectively employed to analyze and address the dynamics of the COVID-19 situation?

Q.6 Set. (C) [3+3]

Q. 6.1 Can you describe three different approaches for forecasting the team's velocity, and outline the strengths and weaknesses associated with each of these methods?

Q. 6.2 With a product backlog totaling 200 story points and the team's capacity estimated between 176 and 236 hours per sprint, consider the following five reference stories with their respective time estimates:

- Story 1: 14 hours
- Story 2: 22 hours
- Story 3: 30 hours
- Story 4: 25 hours
- Story 5: 20 hours

How do estimates influence sprint planning and help the team make velocity commitment range: low and high for backlog items?