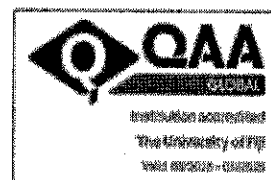


The University of Fiji
(An Entity of Arya Pratinidhi Sabha of Fiji)



SCHOOL OF SCIENCE AND TECHNOLOGY

Semester 1, 2026

FINAL EXAMINATION PAPER

ITC213: SYSTEMS ANALYSIS AND MODELLING

Important Instructions to Students:

1. Read the questions, instructions carefully and answer the questions.
2. You are allowed an **extra 10 minutes reading time** (during this time, you are not allowed to write with pen) and **180 minutes (3 Hours) to complete this paper**.
3. Silent, non-programmable calculators are allowed, but not supplied.
4. Write all your answers in the answer booklet provided. If you need extra sheets, please ask from the supervisor. Write your name, course code and student identification number in the answer booklet and in the attendance sheet.
5. This paper contains three (3) sections A, B and C. All questions are compulsory to answer.
6. Write all your answers legibly. The marker has the right to award zero for answers that are not legible.
7. This is a **Closed Book Examination**. The University views plagiarism, cheating and dishonest practice as serious offences and if found, offenders are penalized.

Examination Paper Content (Format):

<u>Section</u>	<u>Question</u>	<u>Content</u>	<u>Marks</u>	<u>Suggested Time</u>
A	1-25	Multiple Choice Questions	25	45 minutes
B	26-38	Open-Ended Questions	40	72 minutes
C	39-40	Case Study Questions	35	63 minutes
		TOTAL	100	180 Minutes

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1. Which of the following best defines systems analysis?
 - A. Designing software code
 - B. Identifying business needs and designing information systems solutions
 - C. Installing hardware
 - D. Managing databases

2. Which of the following is considered a system request reason?
 - A. Better font design
 - B. Improved service
 - C. More office space
 - D. Reduced internet use

3. A Work Breakdown Structure (WBS) is used to:
 - A. Encrypt data
 - B. Break a project into manageable tasks
 - C. Build databases
 - D. Design user interfaces

4. Which chart visually represents project schedules over time?
 - A. DFD
 - B. ERD
 - C. Gantt Chart
 - D. Use Case Diagram

5. PERT/CPM charts are most useful for:
 - A. Interface prototyping
 - B. Critical path scheduling
 - C. Security testing
 - D. Database normalization

6. Which is a common challenge in requirements engineering?
 - A. Coding syntax
 - B. Scope creep
 - C. Hardware upgrades
 - D. Printer failure

7. Functional requirements describe:
- A. System quality attributes
 - B. What the system should do
 - C. Programming language
 - D. Hardware configuration
8. Which model describes “what” a system does rather than “how”?
- A. Physical model
 - B. Hardware model
 - C. Network model
 - D. Logical model
9. In object-oriented analysis, objects represent:
- A. Only data
 - B. Real-world entities with attributes and methods
 - C. Only processes
 - D. Hardware devices
10. Which of the following is an attribute?
- A. Customer
 - B. Order
 - C. Customer Name
 - D. Invoice
11. Human-Computer Interaction (HCI) focuses on:
- A. Hardware repair
 - B. User-system interaction design
 - C. Database security
 - D. Financial reports
12. Which is a major goal of user interface design?
- A. Increase server load
 - B. Reduce storage
 - C. Increase complexity
 - D. Improve user productivity

13. A system architecture describes:

- A. Physical and logical structure of the system
- B. User passwords
- C. Marketing plans and business case
- D. Salary structure and organizational chart

14. Scalability refers to:

- A. Password length
- B. Data entry speed
- C. Screen size
- D. System's ability to grow with demand

15. Legacy systems are:

- A. New cloud systems
- B. Older existing systems still in use
- C. Mobile applications
- D. Temporary software

16. Cloud computing primarily offers:

- A. Local-only storage
- B. Manual processing and the invention of the proxy server
- C. Remote scalable computing resources
- D. Printed reports

17. Which technique helps validate system requirements?

- A. Coding
- B. Reviewing and prototyping
- C. Hardware upgrades
- D. Outsourcing

18. Which of the following best supports agile requirements?

- A. Continuous user collaboration
- B. Rigid documentation only
- C. No testing
- D. Fixed scope forever

19. Which modelling artifact is most appropriate for identifying conceptual classes and associations in a problem domain?

- A. Gantt Chart
- B. Domain Model
- C. Network Diagram
- D. SWOT Matrix

20. In use case modeling, which component is most critical for handling exceptional conditions?

- A. Preconditions
- B. Main success scenario
- C. Alternative flow of events
- D. Postconditions

21. Consider the following sequence diagram (Figure 1) to answer the question.

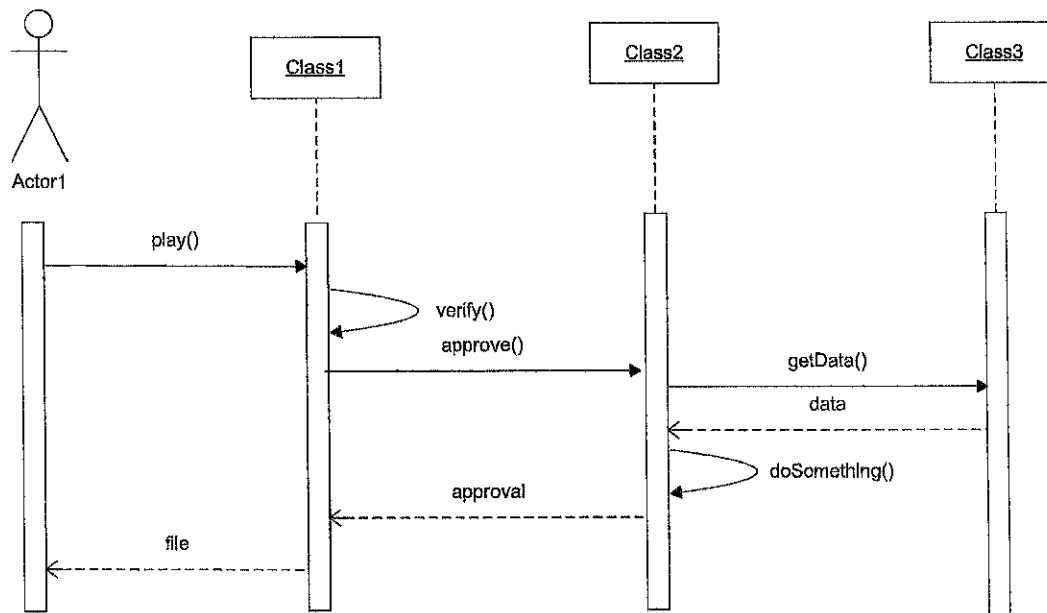


Figure 1: Sequence Diagram

Which of the following options show the correct methods of classes Class1, Class2, and Class3?

A.	::class1 play() doSomething()	::class3 getData()	::class2 approve() verify()
B.	::class1 play() verify()	::class3 getData()	::class2 approve() doSomething()
C.	::class1 play() doSomething()	::class3 getData() data()	::class2 approve() verify() approval()
D.	::class1 play()	::class3 getData()	::class2 approve()

22. Consider the following class diagram (Figure 2) to answer the question.

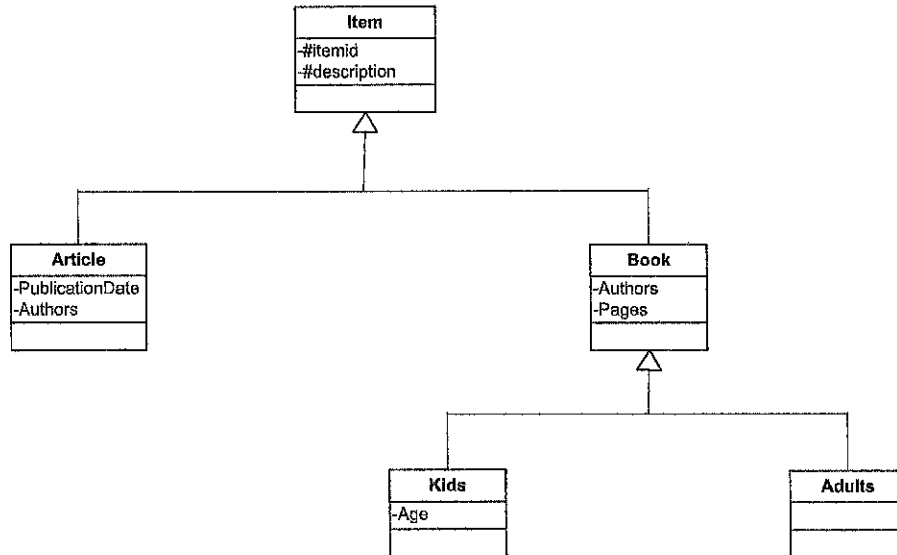


Figure 2

Which of the following is NOT an attribute of class Kids?

- A. ItemID
- B. Pages
- C. Age
- D. Authors

23. The chief task of object-oriented program design is to assign _____ to the objects.

- A. Classes
- B. Protocols
- C. Association
- D. Responsibilities

Question 24 and 25 refers to Figure 3.

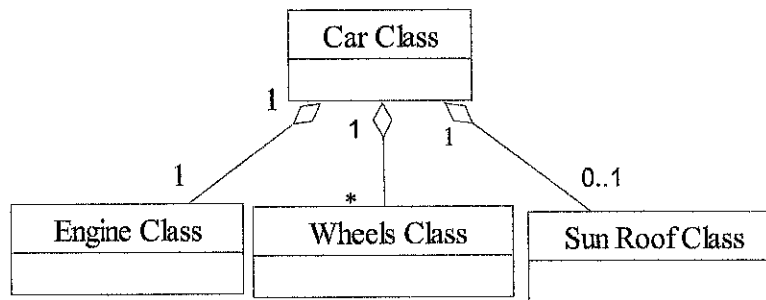


Figure 3

24. Diagram shown in Figure 3 is an example of _____.

- A. generalization with multiplicity
- B. inheritance with multiplicity
- C. aggregation with multiplicity
- D. composition with multiplicity

25. The TRUE statement that that represents Figure 3 is _____.

- A. A car consists of one engine, unlimited number of wheels and an optional sun roof.
- B. A car consists of one engine, zero or more wheels and zero sun roof.
- C. A car consists of one engine, zero or more wheels and an optional sun roof.
- D. A car consists of one engine, an optional wheel and an optional sun roof.

Section B**Open Ended Questions****[40 marks]**

26. Discuss the consequences of ambiguous requirements in enterprise development.
[2 marks]
27. Compare JAD and RAD as requirements strategies.
[2 marks]
28. Explain the distinction between <<includes>> and <<extends>> association with the help of examples.
[2 marks]
29. Information systems have different type of users. Discuss four different types of users.
[2 marks]
30. Objects cooperate to carry out the work of the system by exchanging messages. Specify three important information needed to communicate.
[3 marks]
31. A retail company is planning to implement an online ordering system to replace its manual process. Management is unsure whether the system is worth investing in. As a systems analyst, explain how you would evaluate the feasibility of this project. Clearly discuss all four types of feasibility with examples.
[3 marks]
32. A hospital wants to develop a patient management system, but different stakeholders (doctors, nurses, and admin staff) have conflicting requirements. Explain how you would gather and validate requirements to ensure the system meets user needs.
[4 marks]
33. A university system includes Students, Courses, and Enrollments. Some team members suggest treating "Grade" as an object. Explain how you would decide whether "Grade" should be an object or an attribute.
[4 marks]
34. Critically discuss how poor requirements engineering and weak modelling practices can lead to system failure, even when project budgets and schedules are well managed. Use examples from systems requests, use cases, domain models, and interface design.
[4 marks]
35. Explain why systems analysts require both technical and business knowledge when designing enterprise systems.
[2 marks]
36. Analyse how SWOT and feasibility analysis contribute to effective systems request evaluation and why is Total Cost of Ownership (TCO) critical in systems planning?
[4 marks]
37. A retail company implements ERP, but employees resist using it because workflows are confusing. Was this primarily a technical or human-centered systems problem?
[4 marks]
38. A national online exam portal crashes during peak access, causing public backlash. As chief analyst, propose a systems analysis strategy to redesign it.
[4 marks]

39. Read this problem statement very carefully and use it to answer parts (i) to (v) of this question. Please clearly state your assumptions. Focus on the proposed system.

The owner of the local video rental store wants to radically change how his video rental business works. Currently, he has the traditional video rental store where customers become members, come into the video rental store to rent a video, and return the video. With his new business plan, he hopes to increase his profit margin by increasing video sales and reducing staff.

In his new business plan, he wants to have the customers do everything online but the picking up and returning the videos. He wants a VRS website that allows the customers to become members or search the video inventory (by video name, actor name, director name, type of video (new release, western, mystery, drama, comedy, children, etc.), or video rating). The VRS website also allows members to log on as a member, search the video inventory (as before), select videos to rent (videos must be located at the store location where the member wants to pick up the videos), modify membership information, and check out the videos.

The member can also pay late fees online since videos cannot be rented by a member with outstanding late fees. The paying of late fees and the rental of videos is to be charged to a credit card number provided by the customer in the membership application process. Provided with each rental is a video rental form which lists, for each video rented, the video ID, video name, and the due date and the rental charges charged to the member's credit card. Rented videos can be returned to any of the owner's video stores. Rented videos that are not picked up within 24 hours are returned to the available inventory; however, the rental charged is not removed from the member's credit card. On the day before a rented video is due to be returned, the VRS will email members with due notices which reminds them that the video is due. This due email will be sent to the member every 3 days after the video's due date. After 60 days of being past its due date, a \$30 charge for each overdue video is processed on the member's credit card, and an email is sent to the member to notify them of this charge. The length of rental is 5 days. The pick-up and return of rented videos is only done through a drive-through facility at the video store. The ability for the customer to come into the video rental store to search for and rent videos is no longer available with this new business plan.

The owner of the video store also wants to automate his inventory processing. He can now get newly ordered videos with a video ID (via a bar code) on the video packaging. When new videos arrive at a store, the owner wants to simply scan the video ID which then retrieves the video information from the video distributor via the Internet (the video distributors provide this feature on their websites). All the video information (i.e., its name, rating (e.g., G, PG, R), director, length in minutes, actors) are automatically stored in the store's video inventory. The owner then indicates the store location where the video will be placed. When he wants to remove a video from the store because it is never rented or it is damaged (or for whatever reason), he simply chooses the remove option and scans the video ID to be removed.

Note on rental fees: the amount of the rental fee is determined by its type. New releases are at a rental fee of \$3.00. All the remaining types except children's are at a rental fee of \$2.00. Children's videos

are at a rental fee of \$1.00. Once a video is no longer considered a new release, the owner changes its type from new release to the appropriate type (western, mystery, drama, comedy, etc.).

- i. Create an event table showing the events of the video rental store. [5 marks]
- ii. Create a use case diagram for the video rental store capturing the functional requirements. [5 marks]
- iii. Create a class diagram, showing the entity classes for the video rental store. Show the classes, the relationship between the classes, the multiplicity of the relationships, and the attributes of the classes. [6 marks]
- iv. The following table shows the flow of events of the use case that is used by the Inventory Manager to update video details. Create a System Sequence Diagram (SSD) using the flow of events. [3 marks]

Description:	The inventory manager wants to update the details of a particular video.	
Actors:	Inventory Manager	
Flow of Events:	Actor	System
	1. The Inventory Manager (IM) enters the video registration. 2. The IM updates the video details 3. The IM submits the change	1.1 Search for the video 1.2 Display video details 3.1 Update the video details. 3.2 Display the updated video details

Table 1: Part of a Use Case Narrative

- v. Give examples of two non-functional requirements of this system. [2marks]

40. Table 2 below shows the events of check out library book. Follow the events and complete the questions that follow.

1.	The library patron enters a library card number.
2.	The use case starts when a library patron arrives at the checkout counter with a book.
3.	The system verifies the library patron's status and then displays a message indicating that the status is good.
4.	The library patron enters a book's identification number.
5.	The system verifies that the book is available and records the transaction. Then it displays the due date.

Table 2: Events for check out library book

- i. Follow Table 2 above and write the flow of events from the expanded use case narrative only.
[5 marks]
- ii. Draw a system sequence diagram from Table 2 above.
[5 marks]
- iii. Write a system operation contract for the first operation shown in the sequence diagram you created above.
[4 marks]

End of Exam