Software Requirements Specification

for

University of Kelaniya Library Management System

Version 2.0 approved

Prepared by

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Revision History

Name	Date	Reason for Changes	Version
Draft SRS	23/10/2020	The initial version of the SRS.	1.0
Intermediate SRS-1	28/10/2020	Added new functional requirements (FR029, FR030, FR031)	1.1
Intermediate SRS-2	02/11/2020	The priority of functional requirements changed due to the validation.	1.2
Intermediate SRS-3	04/11/2020	New validation technique added to validate requirements. (Requirement Interaction Metrix)	1.3
Final SRS	06/11/2020	Completely validated and finalized SRS.	2.0

1. Introduction

The University of Kelaniya Library was built around the Vidyalankara Pirivena Collection with the elevation of the Pirivena to a fully pledged University status in 1959. The present library collection encompasses over 248,078 printed books and nearly 100,000 eBooks about various academic disciplines ranging from Archaeology to Zoology and subscriptions to about 22,313 academic journals.

University students Lectures and staff can lend books from the library. Also, they can search for a book from the Library website. Library also provides Printing and scanning services to members. Document supply service is another essential service of the Library system it is only for registered users. The soft or hard copy of the requested document delivered to users when requested items are unavailable in the library. Registered users can download the requested document form in the library web site and fill it and give it back to the university library.

In the purposed library management system, our main focus is to engage more students, lectures and non-academics to the library. In our surveys we have seen most of the student are not registered to the library yet, the reason for that is students have no time to visit the library and fill a bunch of forms for that we introduce both web app and mobile application to users. By using proposed system users can register to the library any time anywhere

The existing library management system has separate accounts for users in that account, store all details about users (lent books, how much fees paid). In our survey, students arise a question about security and privacy about user accounts because of that we proposed a new data encryption method to the user account. In the proposed system we have restriction to the librarian about viewing user accounts

To sign the proposed library management system app user must enter student email address and confirmation code that system automatically sends to their mails. The system not allowed to sign outside people to the app. Also, the mobile app has chatbot to help users so users can ask any questions about the app. Screenshots of the existing library web site are attached to the appendix.

1.1 Introduction to the website

1.2 Vision and mission

Vision

- To be an outstanding academic library which can deliver a state-of-the-art, user-focused information service and facilities in realizing the university vision and mission.

Mission

- To maintain, develop and provide the collections, services and physical environment that best support the educational, research and diverse information needs of the university community.
- To develop students' core academic skills for independent and lifelong learning through a coordinated range of high quality, timely responsive and cost-effective learning support services.

2. Requirement Elicitation / Systems Analysis

2.1 Stakeholder analysis

Stakeholder	**Responsibility**
The University	Ensure the library provides sufficient facilities for education and research
Librarian, Deputy librarian	Responsible for the library system, media services, acquisition, cataloguing, video unit, counter services
System manager	Ensure system works properly; respond to problems. Communicate with the system supplier.
Cataloguing librarian	Maintain catalogue enquiry facility Online public access catalogue.
Senior technician	Manage the video/media unit of the library.
Acquisition manager	Order new books for the library
Library administrator	Manage finance and resources
Principal technician	Manage media services
Senior tutor librarian	Provide consultation, teaching, and liaison with the university, assess books for purchasing
Library assistant, information service assistant	Issue and renew library items, and deal with queries and inter-library loan requests
Library user	Use facilities offered by the library including borrowing library materials, inter-library loan, photocopy, fax, reservation and renewal of library materials.
University system admin	Controls and manage all the activities and processes in the university system
Library system admin	Controls and manage all the activities and processes in the university library subsystem
Publisher	Supply library materials such as books and journals
System suppliers	Supply software for upgrading and carry out major maintenance.
Other libraries in government universities	Lend and borrow materials, if not available in the university library.
The local and central government	Make policies and regulations

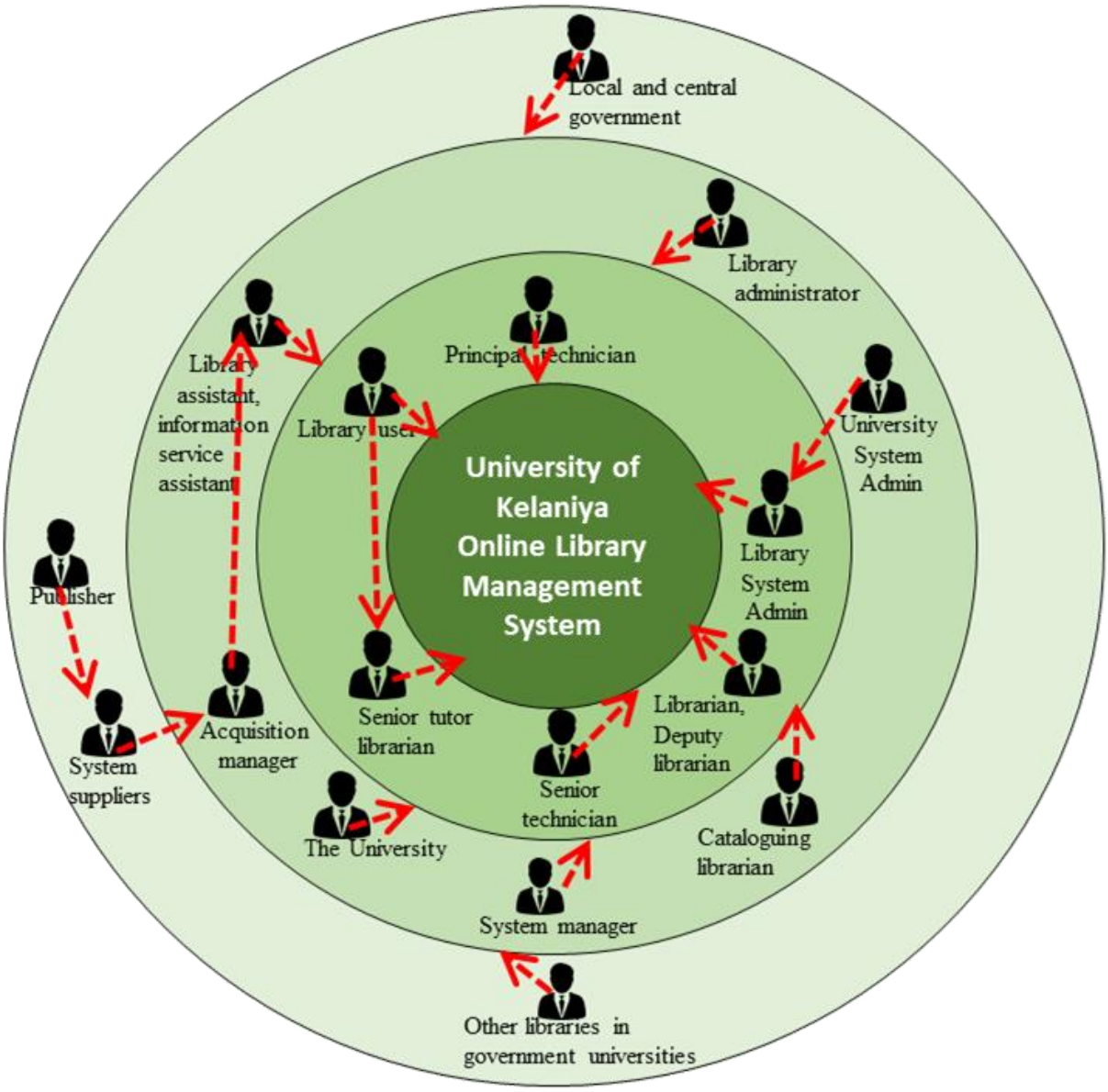


Figure 1: Onion model to present the stakeholders

2.2 Requirement elicitation plan

Objective	Technique	Subject(s)	Time commitment
To get background on the University of Kelaniya current manual library system	Background reading	Articles from the current official website of the library at University of Kelaniya	1 day
To establish library objectives. Agree on the likely scope of the new system. Check out the involvement of stakeholders	Interview (via telephone call)	Librarian	20 min x 1
To gain an understanding of the stakeholders, structure for University of Kelaniya current library system.	Interview (via telephone call)	Librarian	
To gather difficulties by using the current manual system.	Questioner	Library members (Undergraduates and postgraduates)	3 min per each for fill the form
To find privacy policies and legislation statements regarding the University of Kelaniya.	Background readings	Current official website in University of Kelaniya	1 day

2.3 Results of elicitation

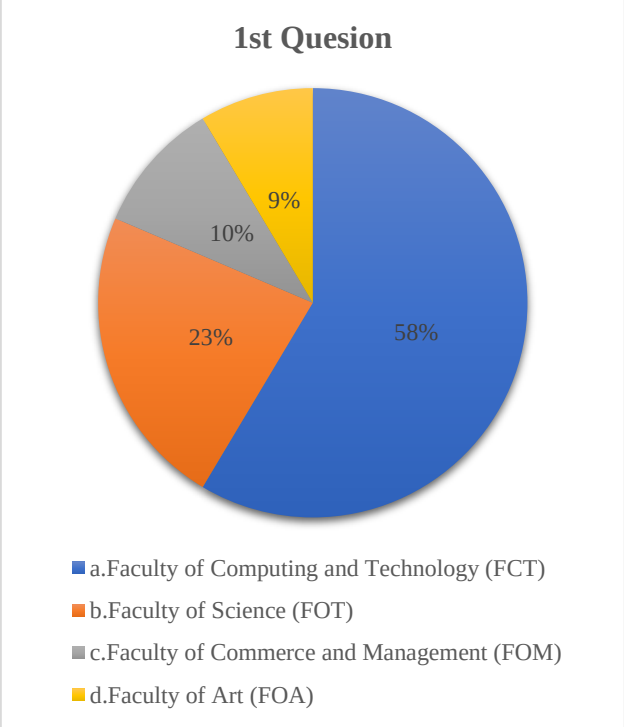
As elicitation techniques, background reading, questioner and Interview used. And sampling also applied for those three techniques because it's difficult to have interviews and questioner with a large number of stakeholders and also a difficult task for referring a large number of background readings. The reasons for planning those to elicitation techniques are,

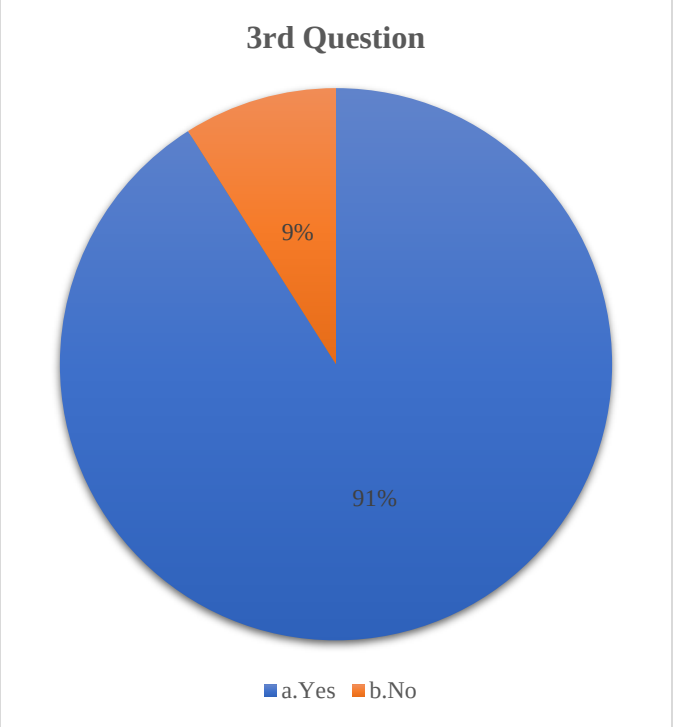
- The information will be sought is a reasonable amount.
- The initial capital of this project is less.

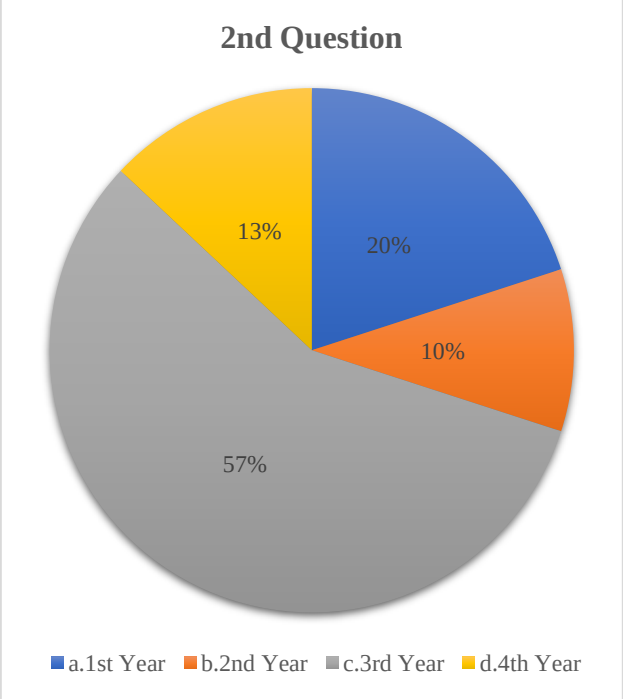
To gather requirements and feedbacks of the current and proposed system, our team created a questioner using Google forms and statistics generated using that questioner. And also prepared an interview session. In this interview session, our team kept interview call recodes.

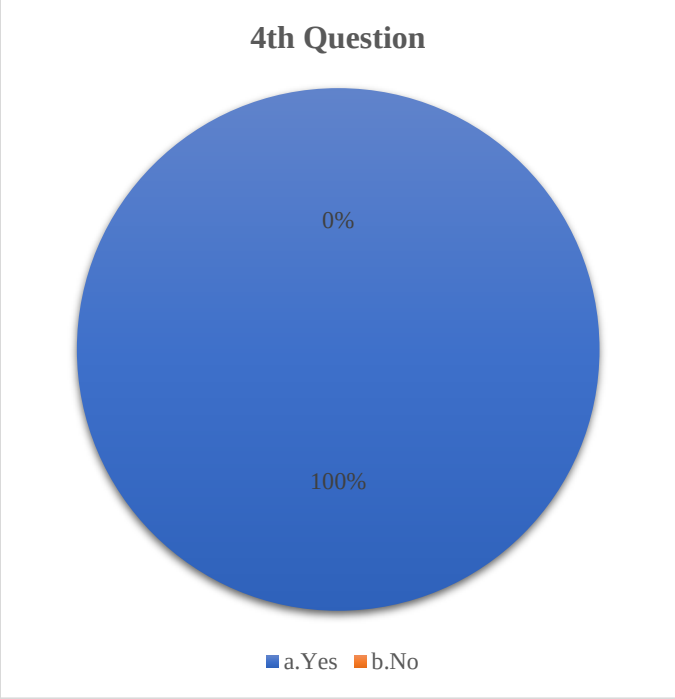
2.3.1 Statistics of the questioner

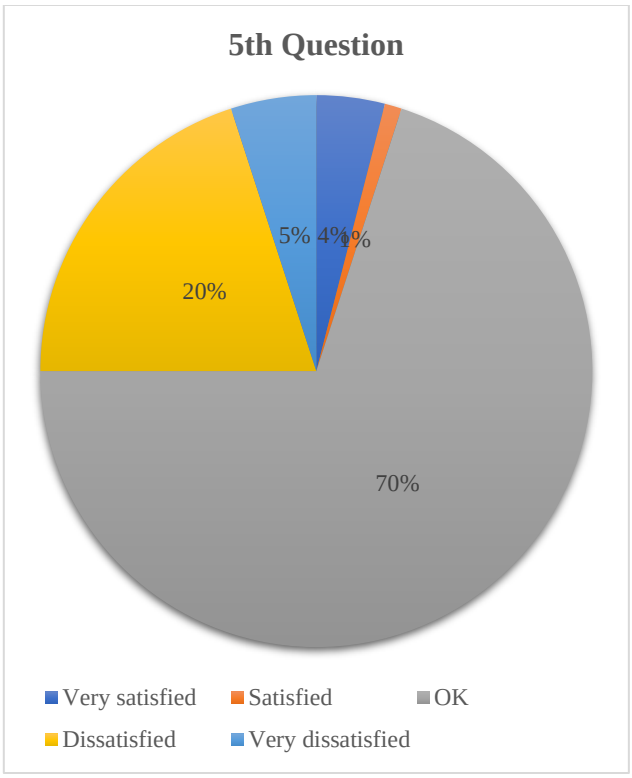
Statistics that are gathered form the questioner are showing in the following pie charts. By using statistics, Generated pie chart for each question was at the questioner. The number of students who answered for this questioner is 547. It is given to gather information from undergraduates and postgraduates who assessing or not accessing library resources of the library. This questioner includes 19 fixed-format questions and 1 free-format question. The questions in this questioner are attached to the appendix in this documentation.

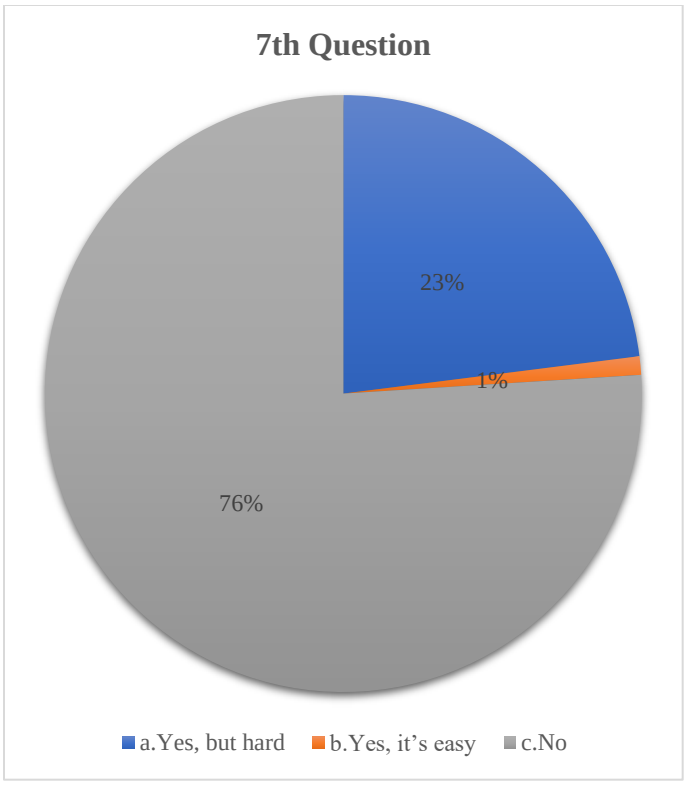

1st Quesion
9%
10%
23%
58%
a.Faculty of Computing and Technology (FCT)
b.Faculty of Science (FOT)
c.Faculty of Commerce and Management (FOM)
d.Faculty of Art (FOA)

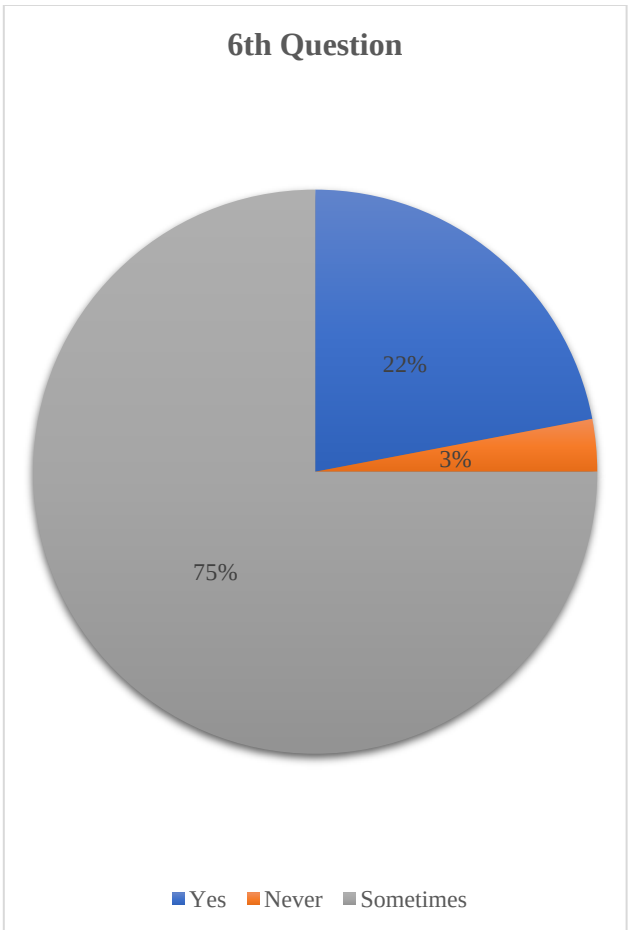

3rd Question
9%
91%
a.Yes
b.No

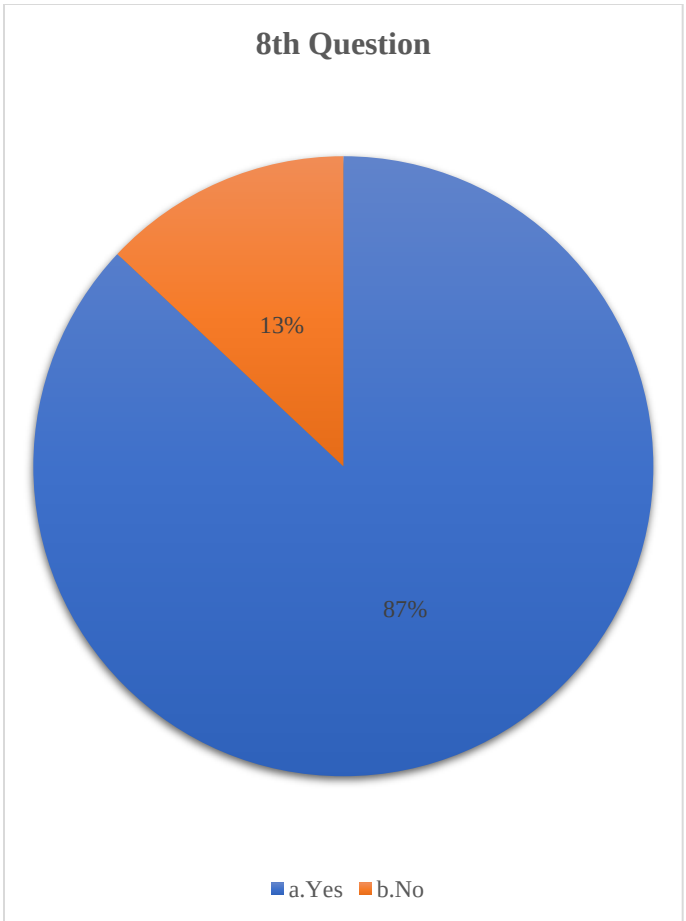

2nd Question
13%
20%
10%
57%
a.1st Year
b.2nd Year
c.3rd Year
d.4th Year

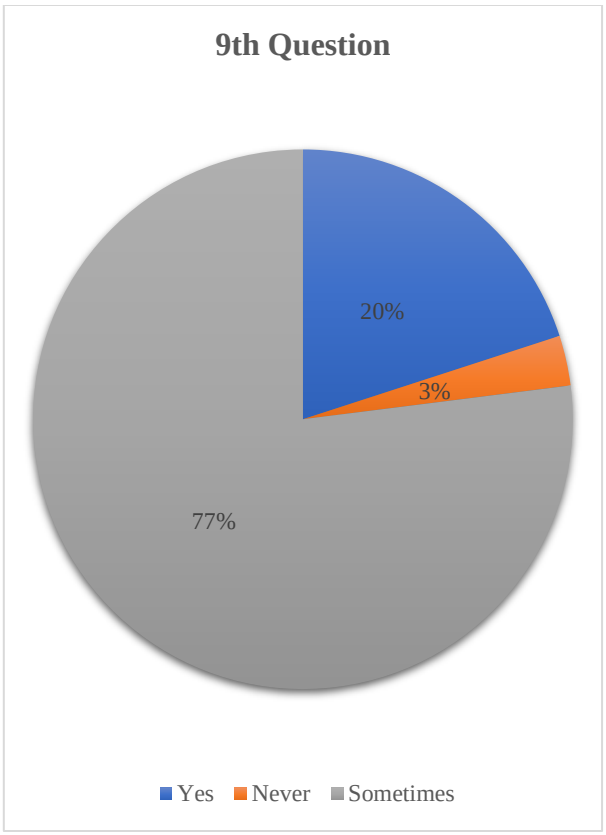

4th Question
0%
100%
a.Yes
b.No

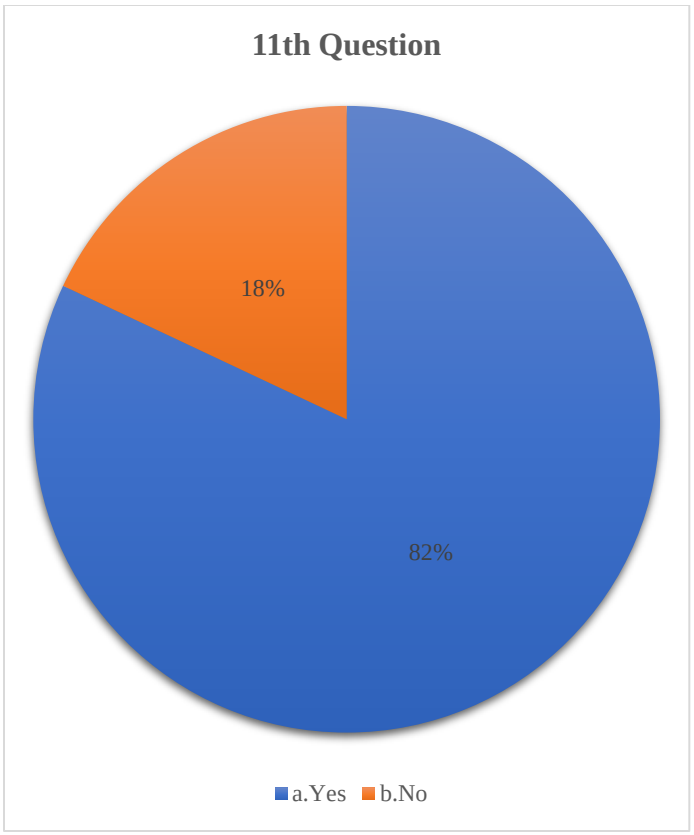

5th Question
5%
4%
1%
20%
70%
Very satisfied
Satisfied
OK
Dissatisfied
Very dissatisfied

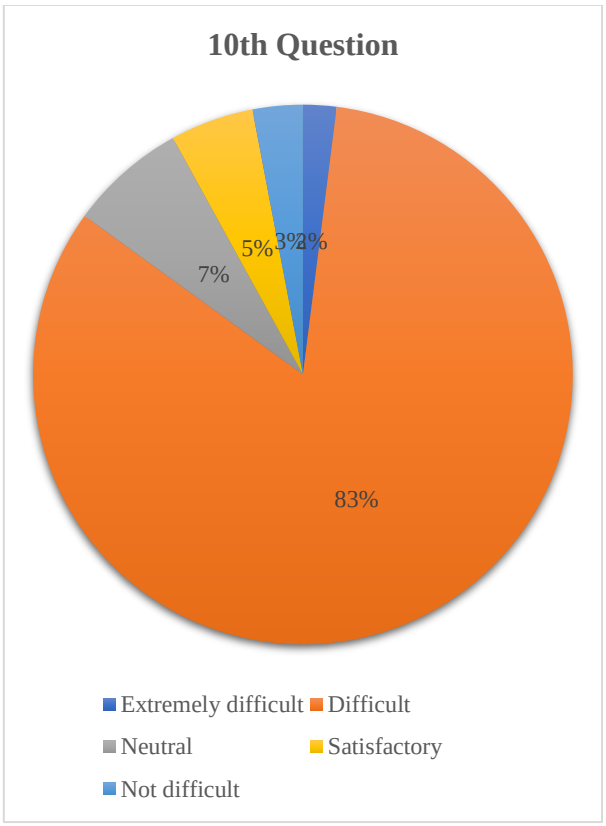

7th Question
23%
1%
76%
a.Yes, but hard
b.Yes, it's easy
c.No

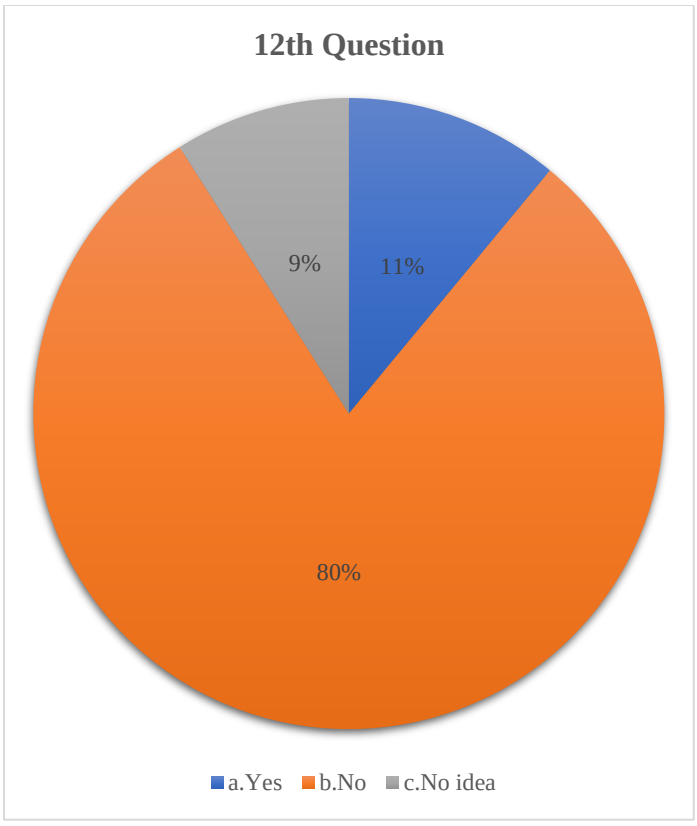

6th Question
22%
3%
75%
Yes
Never
Sometimes

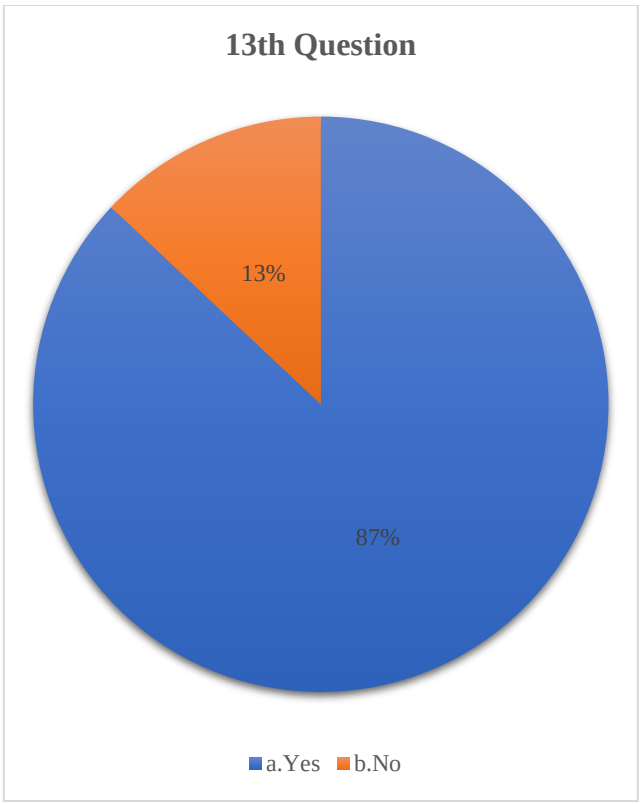

8th Question
13%
87%
a.Yes
b.No

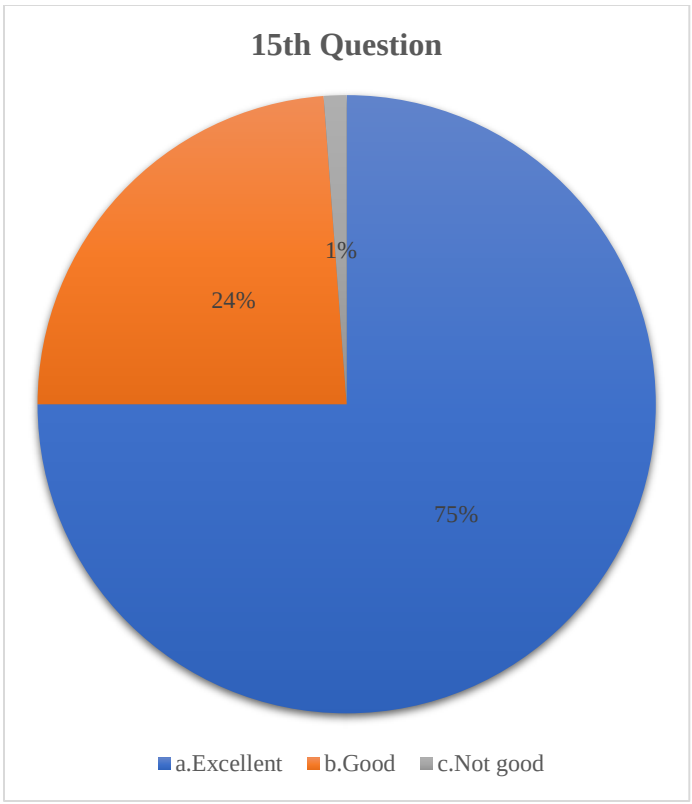

9th Question
20%
3%
77%
Yes
Never
Sometimes

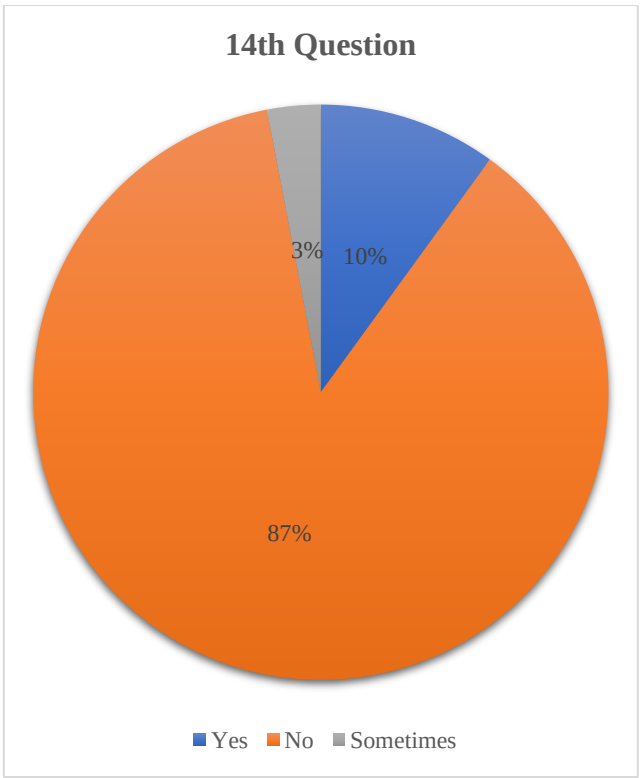

11th Question
18%
82%
a.Yes
b.No

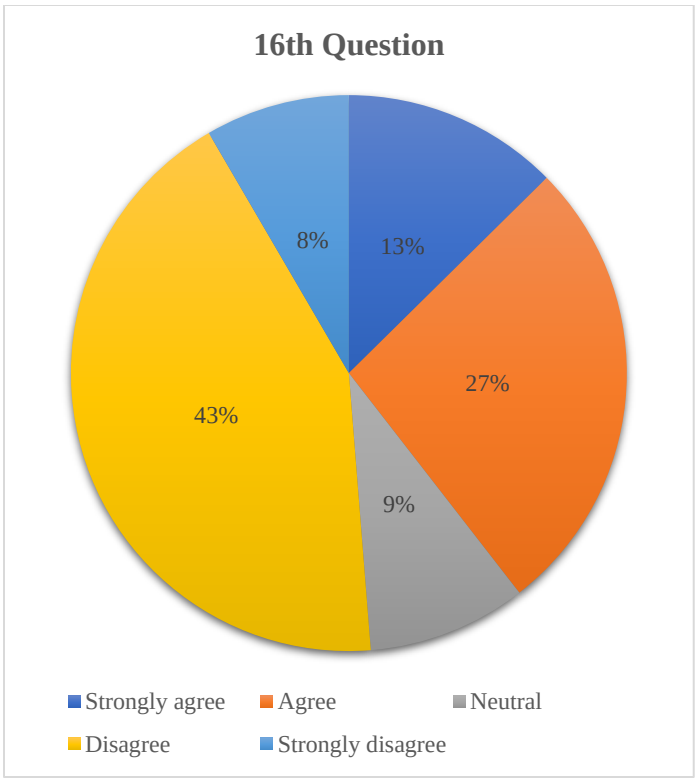

10th Question
3%
2%
5%
7%
83%
Extremely difficult
Difficult
Neutral
Satisfactory
Not difficult

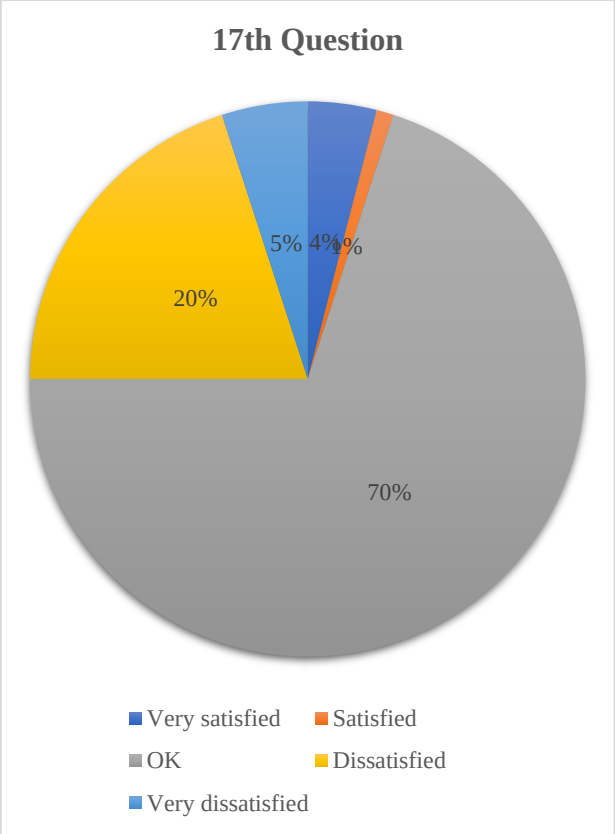

12th Question
9%
11%
80%
a.Yes
b.No
c.No idea

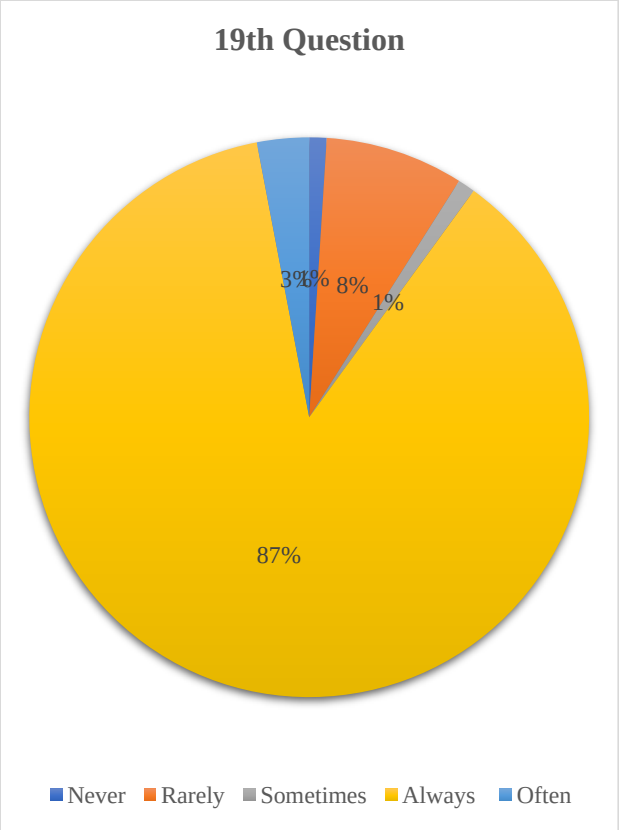

13th Question
13%
87%
a.Yes
b.No

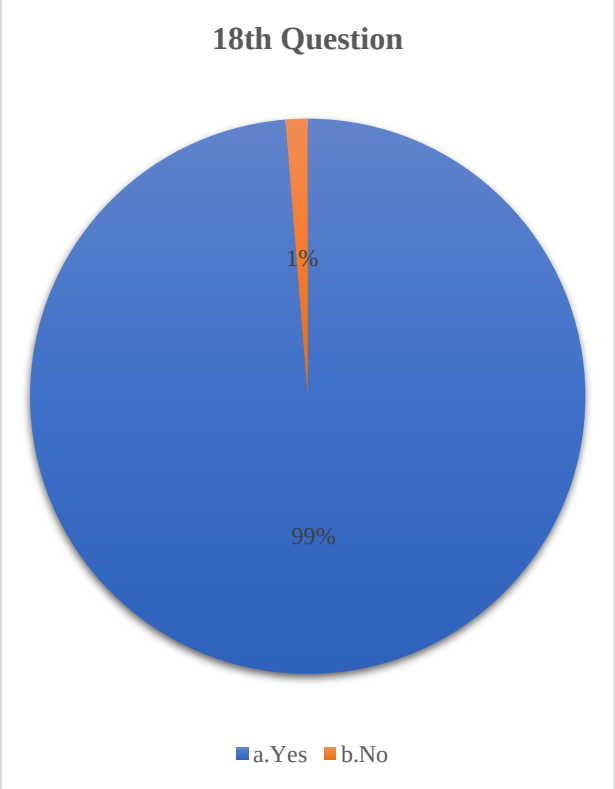

15th Question
1%
24%
75%
a.Excellent
b.Good
c.Not good


14th Question
3%
10%
87%
Yes
No
Sometimes


16th Question
8%
13%
27%
43%
9%
Strongly agree
Agree
Neutral
Disagree
Strongly disagree







20th Question

This question is a free-format question. So, each person submitted different types of challenges. Considering those results, our team gathered common challenges that university undergraduates and postgraduates are facing.

- Students needed a method to reserve books before they come to the library because unnecessary students are borrowing those books rather than necessary students.
- Students needed a map to access resources within the library.
- Students need to see the availability of the book before they are coming to the library.

2.3.2 Findings on the interview session

Requirements gathered from each interview question mention in the bellow. This is a structured interview. This interview session is conducted with the librarian of the University of Kelaniya. All the interview questions and given answers are attached to the appendix in this document.

Identified requirements from the 2nd question

- Registration, login is already there. It should be added to the new system also.

Identified internal stakeholders from the 3rd question

- Librarian
- System manager
- Cataloguing librarian
- Senior technician
- Acquisition manager
- Library administrator
- Principal technician
- Senior tutor librarian
- Library assistant
- Library user
- University system admin
- Library system admin
- Publisher
- System suppliers

These job roles have their duties. They are explained at 2.1. (Stakeholder analysis)

Identified requirements from the 4th question

- There should be a book managing (add, update, remove) method for the librarian.
- All members should be able to search for books and see reserved and borrowed books.
- Library users should be reserve books and extend bookkeeping time.

Identified requirements from the 5th question

- Academic staff should be able to upload E-Books and past papers. Library users should be able to access them.

Identified requirements from the 6th question

- Library users should be seeing their profiles, borrowing history and also any other details regarding borrowing books.

Identified requirements from the 7th question

- There should be a fines calculation system and notification system for late returning and fines.

Identified requirements from the 8th question

- There should be an online payment system. And, payments can be done manually.

Identified requirements from the 10th question

- Sending feedback is already there. It should be added to the new system also. There should be a chat system with library staff for library users.

2.4 System Requirement Specification

2.4.1 Functional Requirements

These Functional requirements are taken by using the *MoSCoW* Method. Considering this method, these requirements are prioritized. Following notations are used to figure out the priority.

Priority level	Notation
Must-Have	M
Should Have	S
Could Have	C
Won't Have this time	W

And also used notations to indicate the existing requirements of the current library system and new requirements of the library management system. Indicated as follows,

Requirement type	Notation
Existing requirement	EX
New requirement	NW

***Note**: Librarian is the person who manages all the activities within the library. So that, In the functional requirements mentioned that librarian holds different duties (Register new users, issue library cards…) but in the real system all that duties performed by other roles who are under the librarian.*

Req.ID	Description	Priority	Req.Type
FR01	Undergraduates and postgraduates should able to access (download) reading materials which are recommended by the specific lecture to a specific course.	M	EX
FR02	Academic staff members should able to upload reading materials which are recommended.	M	EX
FR03	Any person should able to access contact details of the library administration.	M	EX
FR04	Any person should able to submit feedback about the system.	M	EX
FR05	Any person should able to see notices from the library.	M	EX
FR06	Any person should able to gather information about the History, Vision and mission of the system.	M	EX
FR07	Undergraduates and postgraduates must able to access (download) past papers.	M	EX

FR08	Any person should able to see rules and regulations and services are offering from the library.	M	EX
FR09	Any person should able to see Library guides.	M	EX
FR010	Any undergraduate or postgraduate or academic staff member should able to access common E-Resources (E-Books, E-Journals).	M	EX
FR011	As a library assistant, he/she should need to collect borrowed books and update the system catalogue.	M	NW
FR012	Any library member should be able to search for books	M	NW
FR013	Members shall be extending bookkeeping time by paying the fee	M	NW
FR014	Members shall be able to remove a reservation	M	NW
FR015	Any library member should able to cancel membership	M	NW
FR016	The librarian should able to cancel the membership of an appropriate member.	M	NW
FR017	The library members should able to register or update an account	M	EX
FR018	Members shall be able to reserve a book online	S	NW
FR019	The library members should able to login to the system	S	NW
FR020	The library members should able to check out books from the system	S	NW
FR021	The librarian should able to issue library cards to library members	S	NW
FR022	The librarian should able to register new users to the system.	S	NW
FR023	The librarian should able to edit book details, remove books, add new books to the system.	S	EX
FR024	Users shall be able to chat with library support system using messenger	S	NW
FR025	Members shall be able to view their account	S	NW
FR026	The system shall be able to reserve available notification to members	S	NW
FR027	The system shall be able to send notification about overdue books	S	NW
FR028	A user could able to personalize their user profiles	S	NW
FR029	As a library user, they could have to make a Wishlist of books, if the book item is currently unavailable.	S	NW
FR030	As the librarian, he/she could able to see statistics of each user and users as a whole.	S	NW
FR031	To give direction to members Library system should provide a 360^{o} view.	C	NW
FR032	As a Library assistant, he/she could need to collect manually all fines from who couldn't perform transactions online.	C	NW
FR033	Members could able to scan library cards and books through barcode reader and reserve, renew and return books. (within the library not online.)	C	NW

Following area discusses all the above user requirements using system requirements.

FR01. Undergraduates and postgraduates should able to access (download) reading materials which are recommended by the specific lecture to a specific course.

- **1.1.** Undergraduate and postgraduate shall able to register to the system before this function.
- **1.2.** Undergraduate and postgraduate shall able to login to the system before this function.
- **1.3.** The system shall not allow accessing other reading materials. Only allows is the materials that are under registration. (If an undergraduate belongs to 3rd year who is studying at Faculty of Computing and Technology, he/she shall able to only access the materials in the category of 3rd-year Faculty of Computing and Technology.)

FR02. Academic staff members should able to upload reading materials which are recommended.

- **2.1.** An academic staff member shall able to register to the system before this function.
- **2.2.** An academic staff member shall able to login to the system before this function.

FR03. Any person should able to access contact details of the library administration.

- **3.1.** The system shall be able to show all the necessary information about library administration. (Telephone numbers, fax numbers, Emails, Address)

FR04. Any person should able to submit feedback about the system.

- **4.1.** Any person who needs to submit feedback, he/she must able to mention the name, Email address, Subject and message.

FR05. Any person should able to see notices from the library.

- **5.1.** Through, the system shall able to show notices to any person.

FR06. Any person should able to gather information about the History, Vision and mission of the system.

- **6.1.** The system shall able to show information about the History and vison and mission to those who interest in the system.

FR07. Undergraduates and postgraduates should able to access (download) past papers.

- **7.1.** Undergraduate and postgraduate shall able to register to the system before this function.
- **7.2.** Undergraduate and postgraduate shall able to login to the system before this function.
- **7.3.** The system shall not allow accessing other past papers. Only allows is the past papers that are under registration. (If an undergraduate belongs to 3rd year who is studying at Faculty of Computing and Technology, he/she shall able to only access the past papers in the category of 3rd-year Faculty of Computing and Technology)

FR08. Any person should able to see rules and regulations and services are offering from the library.

8.1. The system must able to show see rules and regulations and services are offering from the library management system.

FR09. Any person should able to see Library guides.

9.1. The system must able to show new arrivals, video guide, VPN service, user guide, document supply service, policies and procedures, library opening hours, library orientation, annual training guide.

FR010. Any undergraduate or postgraduate or academic staff member should able to access common E-Resources

10.1. An undergraduate, postgraduate or academic staff member shall able to register to the system before this function.

10.2. An undergraduate, postgraduate or academic staff member shall able to login to the system before this function.

FR011. As a library assistant, he/she should need to collect borrowed books and update the system catalogue.

11.1. The library assistant should need to log-in before to do those activities.

FR012. Any library member should be able to search for books

12.1. The system shall allow searching members to by category

12.2. The system shall allow searching members to by the author

12.3. The system shall allow searching members to by the title of the book

12.4. The system shall allow searching members to by publication date

FR013. Members shall be extending bookkeeping time by paying a fee

13.1. The system shall allow members to pay their fees online

13.2. The system shall allow authenticating members' online paying gateways

13.3. The system shall allow sending a notification to remind members to return their books

FR014. Members shall be able to remove reservation.

14.1. The system shall allow removing reserved book any time

14.2. The system shall have the ability to update the database accordingly

FR015. Any library member should able to cancel membership.

15.1. The system shall allow cancelling membership of a member when the member should need to pay all fines if he/she has.

15.2. The system shall allow cancelling membership of a member when the member should need to borrow all the books to the library.

15.3. The system shall allow cancelling membership of a member if a member stole a book or damaged a book, he/she needs to pay an appropriate amount that the library is estimated.

15.4. The system shall allow cancelling membership of a member when the member needs to present an appropriate reason to leave.

FR016. The librarian should able to cancel the membership of an appropriate member.

16.1. The system shall allow cancelling the membership of the member when he/she able to violate one or more reasonable policies and procedures in the library.

16.2. The system shall allow cancelling membership of the member when librarian mistakenly adds a member to the system.

FR017. The library members should able to register or update an account.

17.1. The system shall allow to register or update of the membership when a user by providing appropriate Username, password (Kelani-net password), status.

17.2. The system shall allow to update of the membership (Name, Course, Description) when the only user registered to the system.

17.3. The system shall allow to register or update of the membership when username and password don't exist in the system. (Users not able to create two more accounts using the same username and appropriate password for that username)

FR018. Members shall be able to reserve a book online.

18.1. The system shall have a database to store reserved books

18.2. The system shall have the capability to dynamically change the state of available books

18.3. The system shall have the ability to send a notification to the member to confirm book reservation

18.4. The system shall have the ability to limit members reservation to three books at a time

18.5. The system shall not allow to reserved book currently not available.

FR019. The library members should able to login to the system.

19.1. The system shall allow to login to the system, when only by providing appropriate username and password that used to the registration (same username and password are using for all the university services.)

19.2. The system shall allow to login to the system when the only user only tries username and password 5 times at the login page. If he/she exceeds the attempts to insert a password to appropriate username, they need to wait 30 minutes to re-enter the password to that appropriate username.

FR020. The library members should able to check out books from the system.

20.1. The system shall allow to check out books from the system, when only once the member login to the system.

20.2. The system should be able to retrieve information like who took a particular book or what are the books checked-out by a specific library member.

20.3. There should be a maximum limit (5) on how many books a member can check-out.

FR021. The librarian should able to issue library cards to library members.

21.1. The system shall allow issuing cards when only he/she registered with the system.

FR022. The librarian should able to register new users to the system.

22.1. The system shall allow registering new users when the person who requests to register belongs to the University of Kelaniya Academic-staff, non-academic staff, undergraduates and postgraduates.

FR023. The librarian should able to edit book details, remove books, add new books to the system.

23.1. The system shall allow to edit book details, remove books, add new books to the system when only librarian login to the system as a librarian (Members shouldn't able to perform)

23.2. When the librarian has done such operation, the catalogue should be updated.

FR024. Users shall be able to chat with library support system using messenger

24.1. The system shall prompt a message to the user to login to their Facebook account in messenger chatbot

24.2. The system shall have predefined common questions to select in chatbot

24.3. System have predefined answers to common questions that users may ask

FR025. Members shall be able to view their account.

25.1. The system shall allow viewing how many books have read by a member

25.2. The system shall allow viewing how many books have read by a member on time

25.3. The system shall allow viewing account to only to member

25.4. The system shall allow storing account details in a protected database

FR026. The system shall be able to reserve available notification to members.

26.1. The system shall allow being tracked requested books by member

FR027. The system shall be able to send notification about overdue books.

27.1. The system shall have the ability to send personalized notifications to members.

FR028. The user could able to personalize their user profiles.

28.1. The system shall have the ability to change the theme of the interface between the dark theme and light theme.

FR029. As a library user, they could have to make a Wishlist of books, if the book item is currently unavailable.

29.1. The system shall be able to reserve a book on first come first serve method from Wishlist(s) of all the members.

29.2. The system shall be able to reserve a book as normal manner when that book not at another's Wishlist.

FR030. As the librarian, he/she could able to see statistics of each user and users as a whole.

30.1. The librarian shall be able to see the tabulated form of data of access history, payment history, trends of readers.

FR031. To give direction to members Library system should provide a 360º view.

31.1. The system shall have a search bar to search for a specific location in the library

31.2. The system shall have navigation capability to navigate users

FR032. As a Library assistant, he/she could need to collect manually all fines from who couldn't perform transactions online.

32.1. The library assistant could need to log-in before to do those activities

32.2. The library assistant could to keep recodes on the system and update the system catalogue.

32.3. The system shall have the ability to pay online through credit cards by inserting card number, Expire date and CVV.

FR033. Members could able to scan library cards and books through barcode reader and reserve, renew and return books.

33.1. To check-out a book, the system checks if the book can be issued and that the book is not 'reference only'. If the book is for reference only, a member can't reserve that specific book.

33.2. To check-out a book, the system checks if the book has been reserved by any other member. If the book has not been reserved.

33.3. To renew a book, the system checks if the book has been returned within the due date. If it's not calculated, create a transaction for the collection and collect fine.

33.4. To renew a book, see if the book has been reserved by any other member. if the book has been reserved by any other member, Create a book checkout transaction with a new due date.

33.5. To return a book, the system checks if the book has been returned within the due date. If it's not calculated, create a transaction for the collection and collect fine.

33.6. To return a book, see if the book has been reserved by any other member. if the book has been reserved by any other member, the system updates the status of the book to '**Available**'.

2.4.2 Non-functional requirements

NFR01. Product requirements

1.1. The user interfaces for University of Kelaniya Library Management System shall be implemented as HTML5, CSS3 and ExpressJS as a middleware.

1.2. The backend for University of Kelaniya Library Management System shall be implemented as MongoDB with NoSQL database and NodeJS.

NFR02. Organizational requirements

2.1. The system development process and deliverable document shall conform to process and deliverables defined in privacy policy statements of the University of Kelaniya, Sri Lanka.

NFR03. External requirements

3.1. The system shall not disclose any personal information about library users (Undergraduates/Academic staff members/ Non-academic staff members) apart from their name, reference number and fetched information to the system operators.

3.2. The system shall access to personal information restricted to the user or appropriate library staff and conform to the applicable state laws addressing the confidentiality of library records as well as another applicable local, state, and federal law.

3.3. The system shall allow to login to the system when the only user only tries username and password 5 times at the login page. If he/she exceeds the attempts to insert a password to appropriate username, they need to wait 30 minutes to re-enter the password to that appropriate username.

3.4. The system shall not use any pirated codes from other systems.

3.5. The system shall only use is authorized FontAwsome icons for the implementation.

3.6. The system shall only use is authorized images for the implementation.

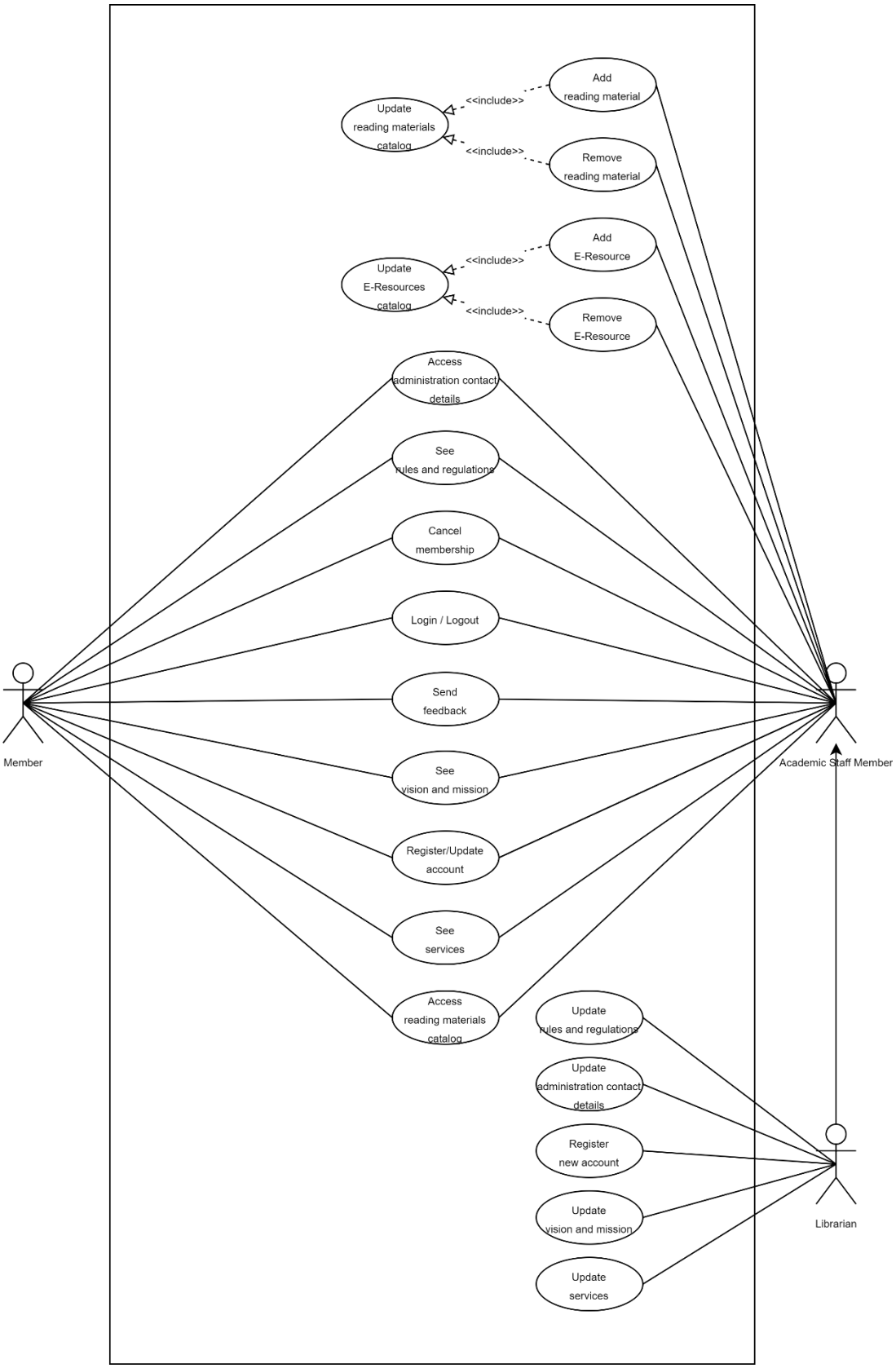
3.7. The system shall use all online transactions between client applications (web browsers, e-book readers etc.) and server applications are encrypted using modern, up-to-date security protocols for SSL/HTTPS.

2.5 Use Case diagram to model the requirements

According to the use case diagram, this has four main actors in our system,

- Librarian: Mainly responsible for adding and modifying books, book items, and users. The Librarian can also issue, reserve, and return book items.
- Member: All members can search the catalogue, as well as check-out, reserve, renew, and return a book.
- System (Online Library Management System): Mainly responsible for sending notifications for overdue books, cancelled reservations, etc.
- Academic staff member: Mainly responsible for uploading reading materials and E-Resources.

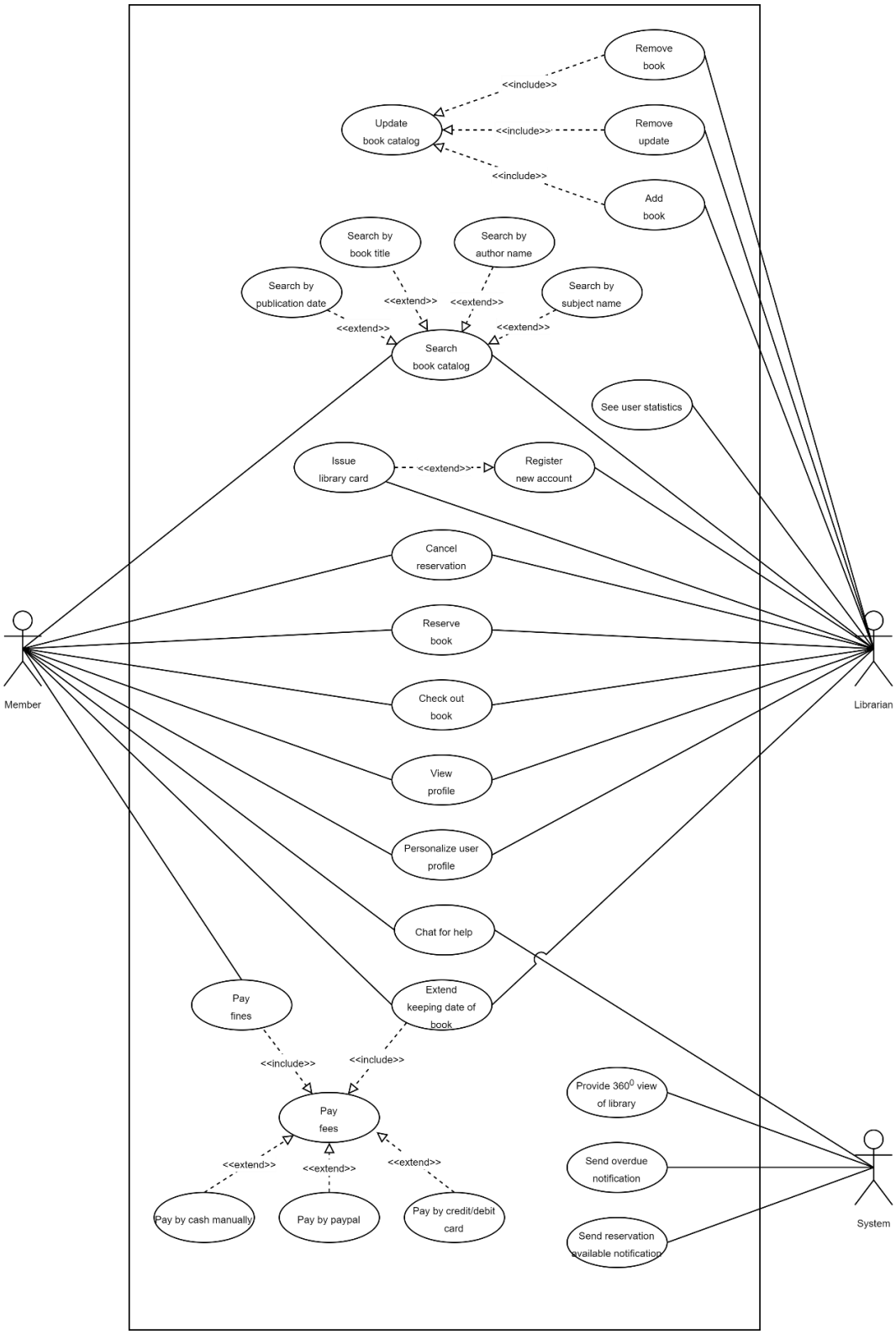
2.5.1 A use case diagram for the existing library



Here are the top use cases of the existing University of Kelaniya Library Management System,

- **Add reading material** – Librarian and academic staff members can add reading materials.
- **Remove reading materials** – Librarian and academic staff members can remove reading materials.
- **Update reading material catalogue** – After adding or removing a reading material, a reading material catalogue will update.
- **Add E-Resource** – Librarian and academic staff members can add E-Resource (ex: E-Books, E-Journals).
- **Remove E-Resource** – Librarian and academic staff members can remove E-Resource.
- **Update E-Resource catalogue** – After adding or removing an E-Resource, E-Resource catalogue will update.
- **Access administration details** – Any members can see administration contact details.
- **See rules and regulations** – Any members can see rules and regulations of the library.
- **Cancel membership** – Any members can cancel their membership of the library.
- **Login/logout** – All users can log to the system and logout from the system.
- **Send feedback** – All users can send their feedback to the system.
- **See vision and mission** – All users can see the vision and mission of the library.
- **Register / Update** – All members of the university can register to the library by giving their details and all library users can update their profile.
- **See services** – Any members can see all the services given by the library.
- **Access reading materials** – Any members can access and download reading materials.
- **Update rules and regulations** – Librarian can update the rules and regulations of the library.
- **Update administration contact details** – Librarian can update the administration contact details regulations of the library.
- **Register new account** – Librarian can register new members to the library.
- **Update vision and mission** – Librarian can update the vision and mission of the library.
- **Update services** – Librarian can update all the services given by the library.

2.5.2 A use case diagram for the proposed library management system



Here are the top use cases of the proposed University of Kelaniya Library Management System,

- **Add book** – Librarian can add new books to the system.
- **Update book** – Librarian can update details of a book of the system.
- **Remove book** – Librarian can remove books from the system.
- **Update book catalogue** – After adding, removing or updating book catalogue will be updated.
- **Search book catalogue** – All users can search for books by their title, publication date, subject name or author name.
- **Issue library card** – Librarian can issue library card for registered members or new members when they are registering.
- **Cancel reservation** – Any members can cancel their book reservations.
- **Reserve book** – Any users can reserve books if they are currently available.
- **Check out the book** – Any users can check out books of the system.
- **View profile** – All users can see their profiles.
- **Personalize user profile** – Users can change the theme of the interface between dark theme and light theme.
- **Chat for help** – All users can chat with the system for getting help.
- **Extend keeping date of a book** – Users can extend the keeping dates of books by paying a fee.
- **Pay fine** – If there are any fines, users can pay them as a fee.
- **Pay fees** – Users can pay fees by credit/ debit card, pay pal account or cash.
- **Provide a 360^0 view of the library** – System will provide a 360^0 view of the library for users.
- **Send overdue notification** – System can send personalized notifications to members.
- **Send reservation available notification** – System allows to be tracked requested books by members and send notifications if the books are available.

3. Requirement Validation and verification

3.1 Justification for the tools/techniques selected

Requirements validation makes sure that the requirements are written in software requirements specification (SRS) must be complete and consistent and are according to the customer's needs. The validation techniques/to use in this project are,

- **Simple checks** – Completeness of the project checked only according to certain syntax rules, templates. And inspected according to traceability.
- **Requirement Review – Review** and inspections, Active reviews as requirement reviews in this section.

Using these techniques, our team made iterative development plan. While our team was using iterative development strategy, we have made 4 different versions of the SRS documents for each stage. The version controlling details are under the Revision History section.

3.1.1 Requirement review

This project has a review team to gather reviews based on their feedbacks. Feedbacks are taken through questioners. It also discussed here under the Active review section. The members of the review team are (User involvement),

- **Students from Faculty of Computing and Technology, Faculty of Ars, Faculty of Science, Faculty of Management** – To this project, our team decided to gather feedback about user experience through different technical backgrounds of different faculty members who are in the University of Kelaniya because this project should need to compatible with all kinds of the technical and non-technical background of students(Undergraduates and Postgraduates). [10 students involved]
- **Library staff members** – To gather feedbacks from library management and the administration, our team has decided to gather feedback from different job roles that belong to the University of Kelaniya library. (8 persons involved)
- **Other external person who is already using another library management system** – Because this kind of people has proper user experience in library management systems. So, our team can gather more realistic feedbacks other than anyone.

From those who above users who involved are used to problem categorization. To categorize the problem using missing information, Requirement conflict, Unrealistic requirement.

To gather missing requirements and Unrealistic requirements, our team has used feedbacks of the questioner. And requirement conflicts and overlapping are taken through requirement interaction Metrix.

3.1.1.1 Requirement Interaction Metrix

This requirement interaction Metrix used to figure out conflicts and overlapping of functional and non-functional requirements.

Overlapping requirements	**O**
Conflict requirements	**C**
Not overlapping or conflict	**X**

	FR01	FR02	FR03	FR04	FR05	FR06	FR07	FR08	FR09	FR10	FR11	FR12	FR13	FR14	FR15	FR16	FR17	FR18	FR19	FR20	FR21	FR22	FR23	FR24	FR25	FR26	FR27	FR28	FR29	FR30	FR31	FR32	FR33	NFR01	NFR02	NFR03
FR01	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR02	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR03	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR04	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR05	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR06	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR07	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR08	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR09	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR12	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR15	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR17	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR18	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR19	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR20	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR22	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR23	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR24	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR25	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR26	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR27	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR28	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR29	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR30	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C	X	X	X	X	X	X	X	X	X	X
FR31	X	X	C	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR32	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FR33	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NFR01	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NFR02	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NFR03	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

3.2 Results of validation and verification

3.2.1 Revised functional requirements

After the validation and verification segment, the priorities of gathered functional requirements are changed due to the interests of stakeholders and Markov and statistics on Elapsed time on specific requirements but the non-functional requirements stay the same. These Functional requirements are taken by using the *MoSCoW* Method. Considering this method, these requirements are prioritized. Following notations are used to figure out the priority.

Priority level	Notation
Must-Have	M
Should Have	S
Could Have	C
Won't Have this time	W

And to indicate the existing requirements of the current library system and new requirements of the library management system indicated as follows,

Requirement type	Notation
Existing requirement	EX
New requirement (Proposed)	NW

The revised Functional requirements as follows. Here is only showing is user requirements. System requirements stay the same as before. You can refer them from 2.4.1. Priority changes indicate in light red colour.

Req.ID	Description	Priority	Req.Type
FR01	Undergraduates and postgraduates should able to access (download) reading materials which are recommended by the specific lecture to a specific course.	M	EX
FR02	Academic staff members should able to upload reading materials which are recommended.	M	EX
FR03	Any person should able to access contact details of the library administration.	M	EX
FR04	Any person should able to submit feedback about the system.	M	EX
FR05	Any person should able to see notices from the library.	M	EX
FR06	Any person should able to gather information about the History, Vision and mission of the system.	M	EX
FR07	Undergraduates and postgraduates must able to access (download) past papers.	M	EX
FR08	Any person should able to see rules and regulations and services are offering from the library.	M	EX

FR09	Any person should able to see Library guides.	M	EX
FR010	Any undergraduate or postgraduate or academic staff member should able to access common E-Resources (E-Books, E-Journals).	M	EX
FR011	As a library assistant, he/she should need to collect borrowed books and update the system catalogue.	M	NW
FR012	Any library member should be able to search for books	M	NW
FR013	Members should be extending bookkeeping time by paying a fee	M	NW
FR014	As a Library assistant, he/she should need to collect manually all fines from who couldn't perform transactions online.	M	NW
FR015	Members shall be able to remove a reservation	M	NW
FR016	Any library member should able to cancel membership	M	NW
FR017	The librarian should able to cancel the membership of an appropriate member.	M	NW
FR018	The library members should able to register or update an account	M	NW
FR019	New users shall be able to chat with library support system using messenger.	M	EX
FR020	Members shall be able to reserve a book online	M	NW
FR021	The library members should able to login to the system	M	NW
FR022	Members could able to scan library cards and books through barcode reader and reserve, renew and return books.	M	NW
FR023	The librarian should able to issue library cards to library members.	S	NW
FR024	The librarian should able to register new users to the system.	S	NW
FR025	The librarian should able to edit book details, remove books, add new books to the system.	S	NW
FR026	Members shall be able to view their account.	S	NW
FR027	The system shall be able to reserve available notification to members.	S	NW
FR028	The system shall be able to send notification about overdue books.	S	NW
FR029	The user could able to personalize their user profiles.	S	NW
FR030	As a library user, they could have to make a Wishlist of books, if the book item is currently unavailable.	S	NW
FR031	The library members should able to check out books from the system.	S	NW

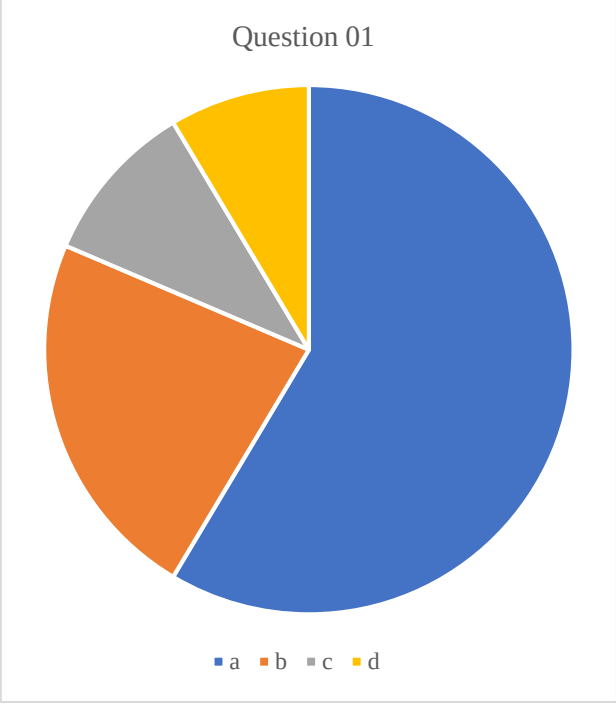
FR032	As the librarian, he/she could able to see statistics of each user and users as a whole.	W	NW
FR033	To give direction to members Library system should provide a 360º view.	W	NW

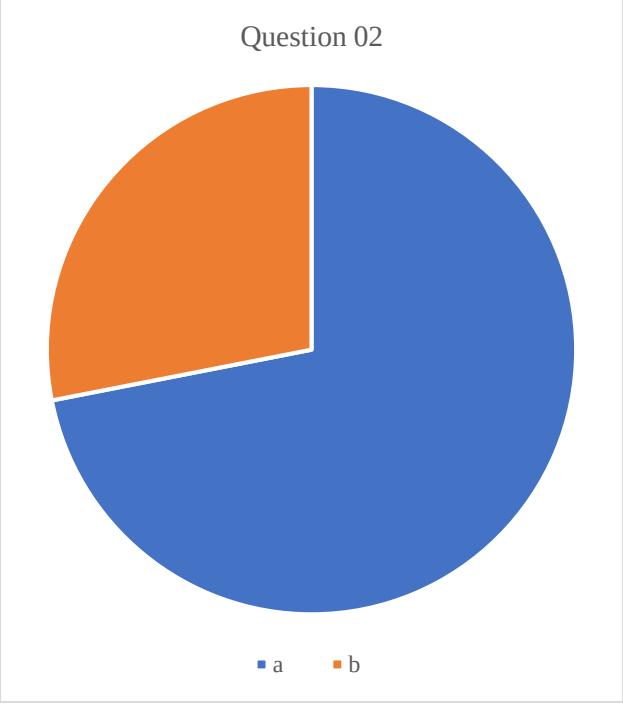
According to the requirement interaction Metrix (Conflicts found) two functional requirements depreciated (FR032, FR033). So, 31 functional requirements are finalized to system design.

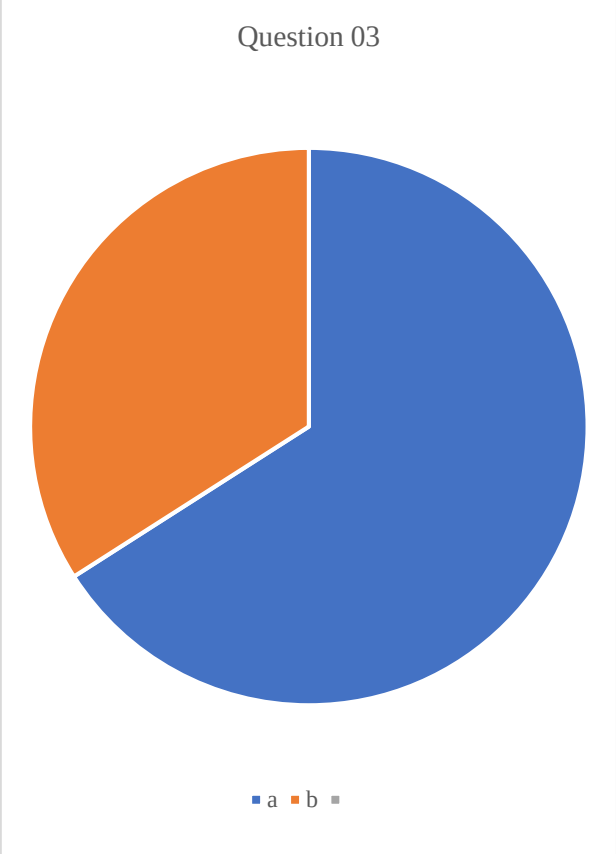
And the priorities of each requirement are changed due to the Active reviews. In the active review, our team made-up a questioner to review team who walkthrough the questioner. At that point, our team figured out some conflicts that we found through requirement interaction Metrix also in this result of the questioner. So, our team has tended to remove those two requirements (FR032, FR033) due to this case.

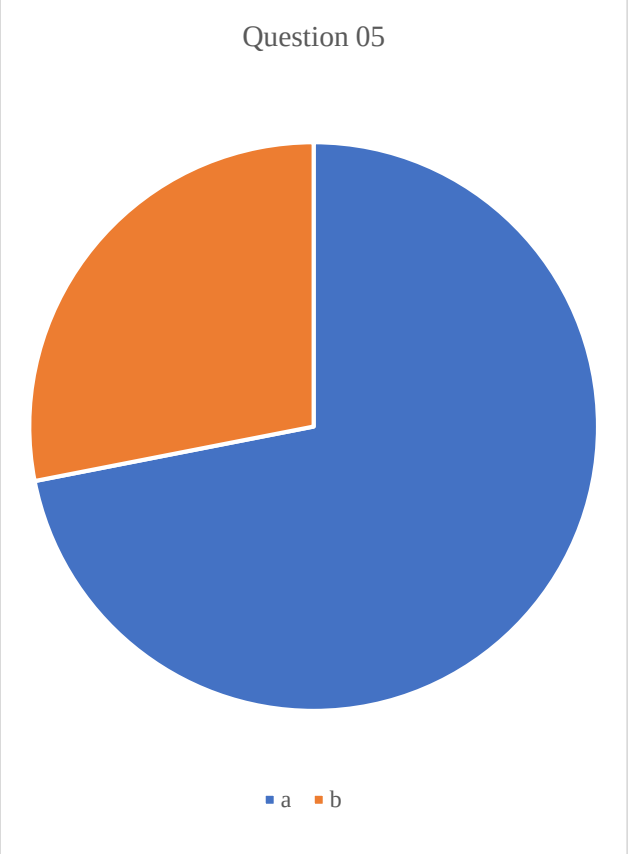
3.2.2 Active review results

In the active review, our team made-up a questioner to review team who walkthrough the questioner. And generated statistics (Pie charts for each question.) using the feedbacks of the questioner. The questioner is in the appendix. These results are taken from 19 persons in the above-mentioned review team. This questioner includes 20 fixed-format questions.






Question 03
a
b


Question 05
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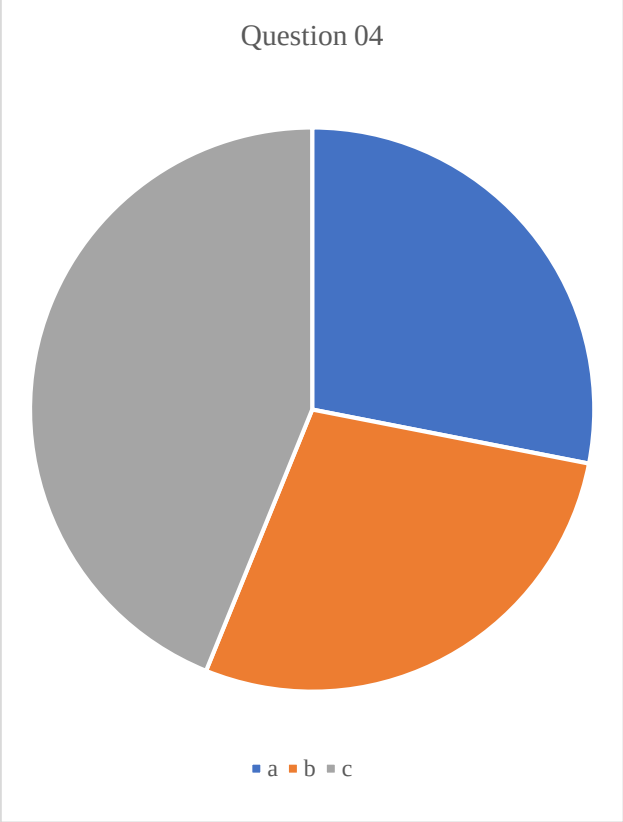
b


Question 04
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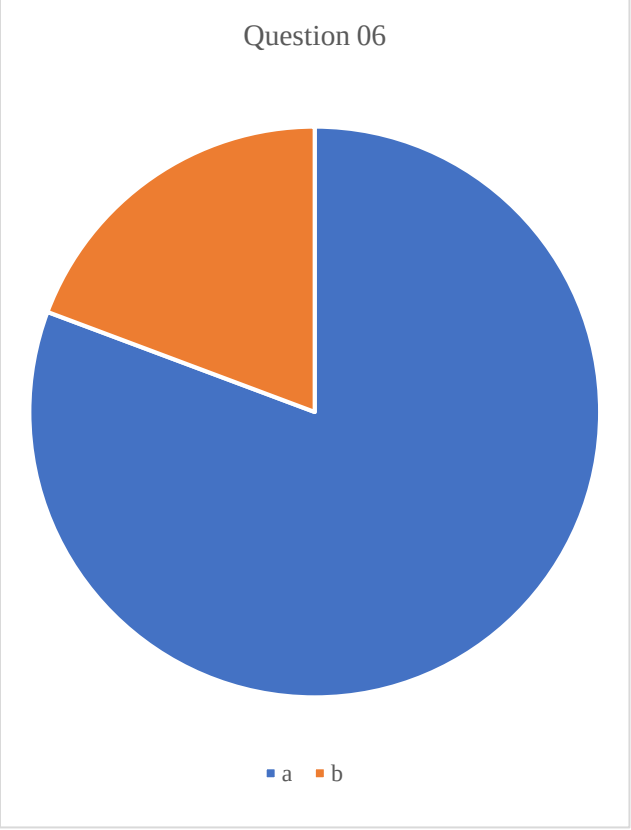
Question 06
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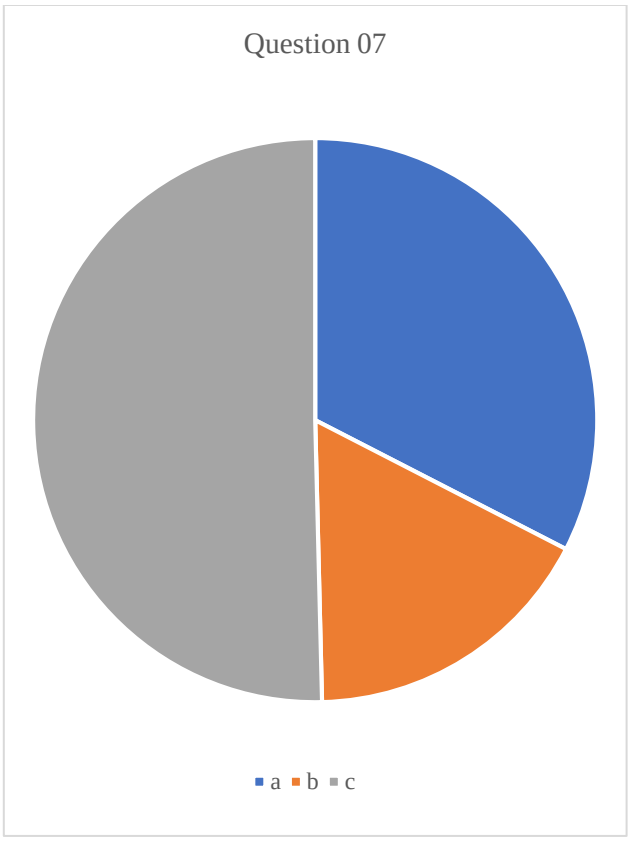
b


Question 07
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b
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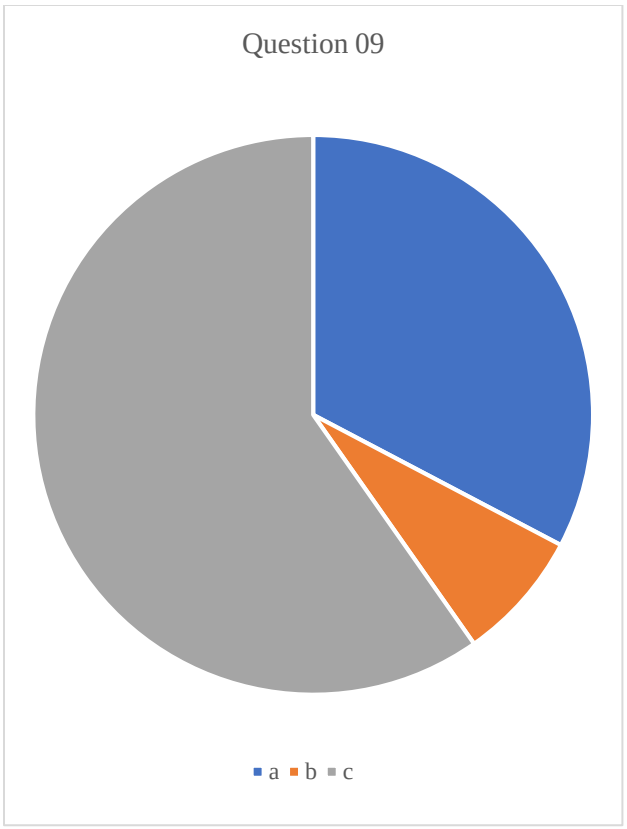
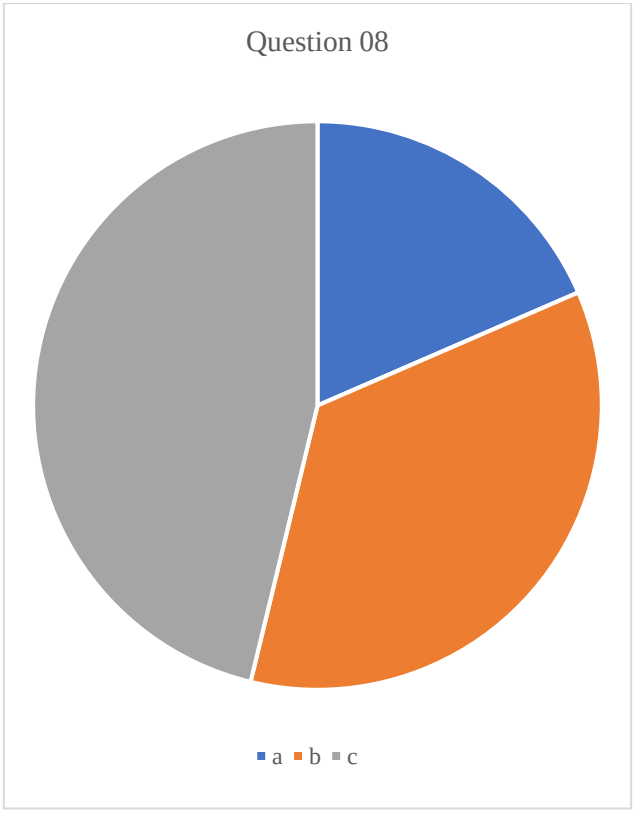
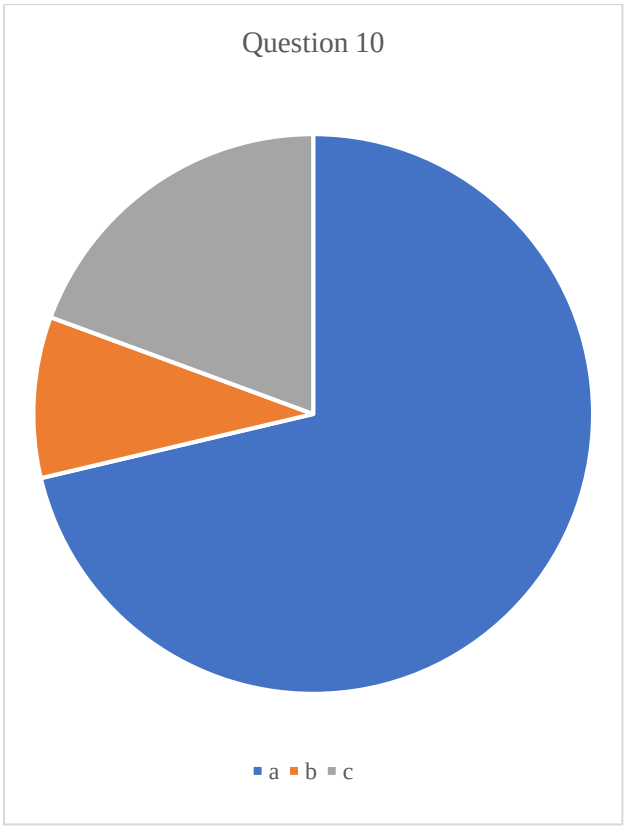

Question 09
a
b
c


Question 08
a
b
c


Question 10
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b
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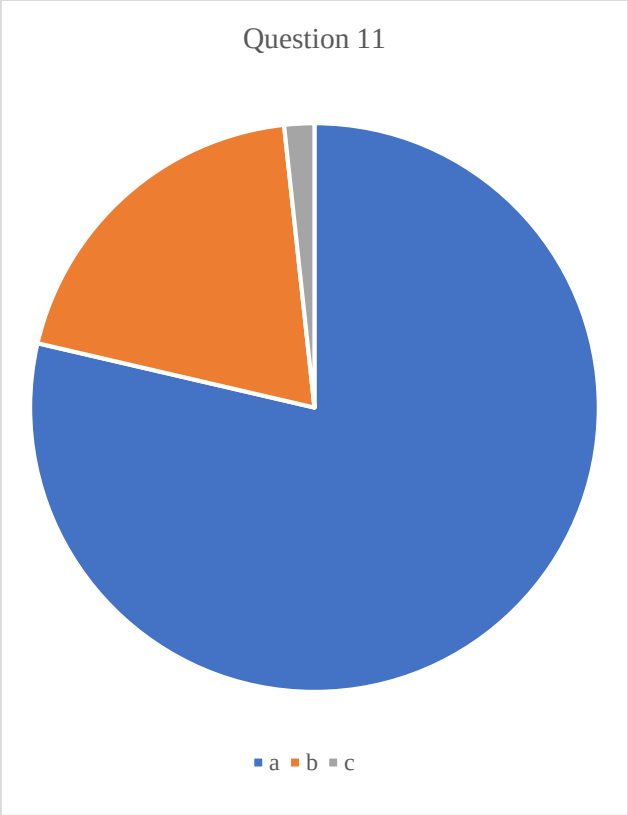
Question 11
a
b
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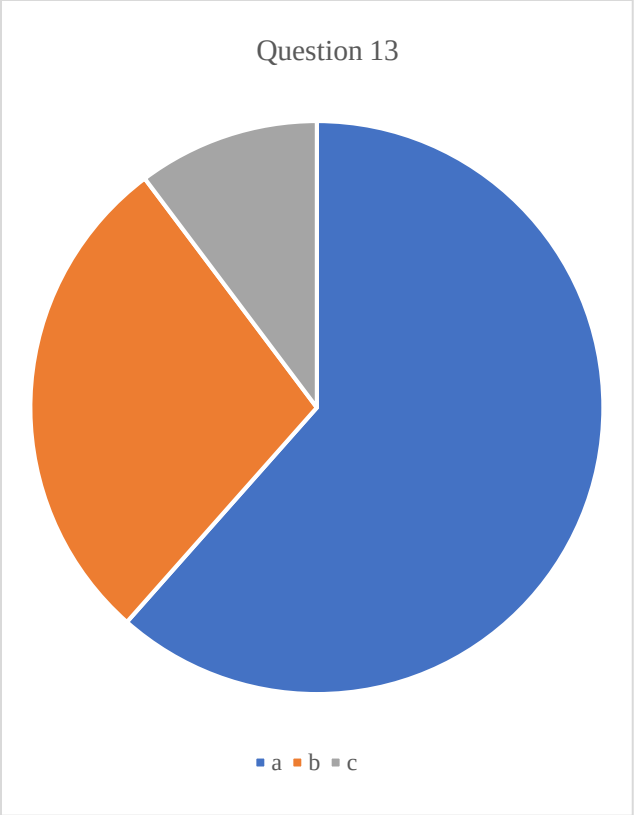
Question 13
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b
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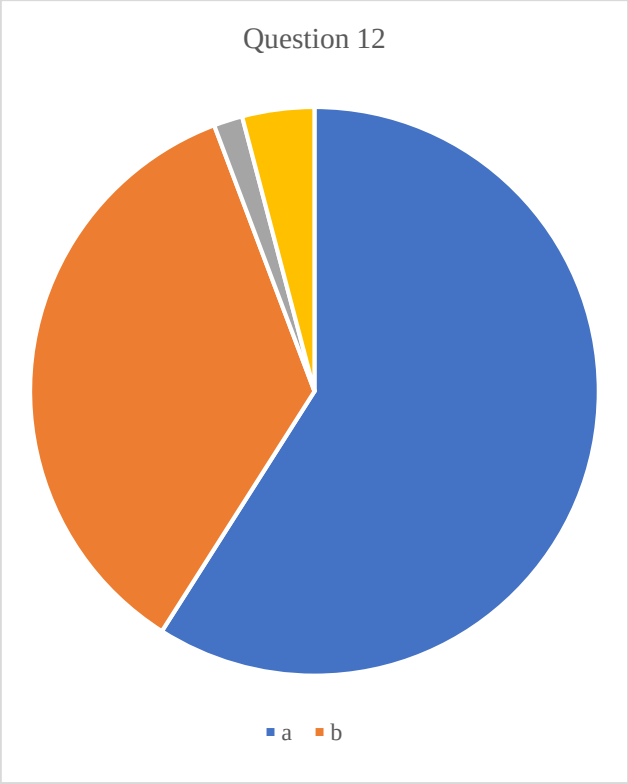
Question 12
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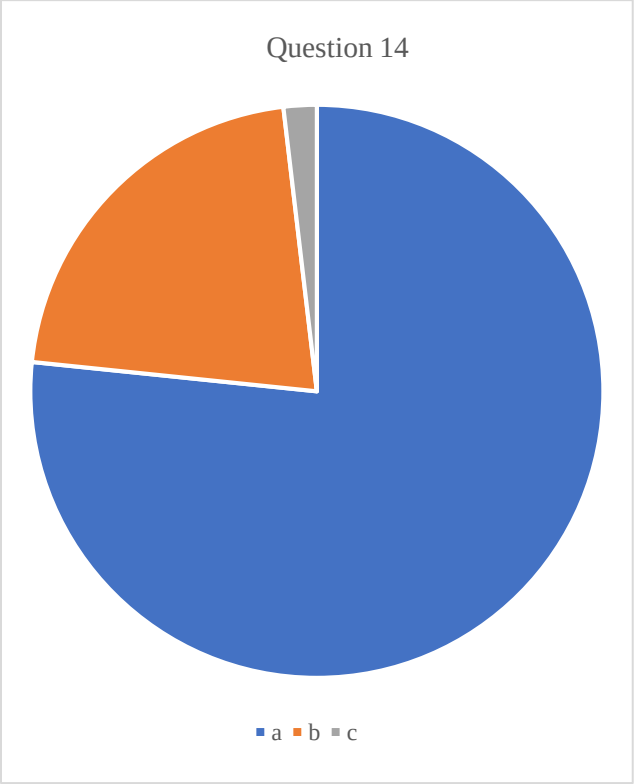
Question 14
a
b
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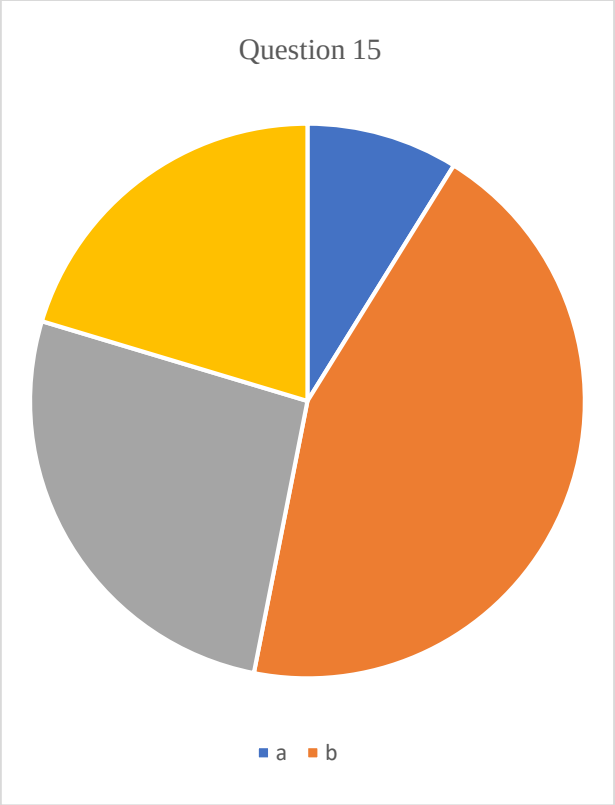
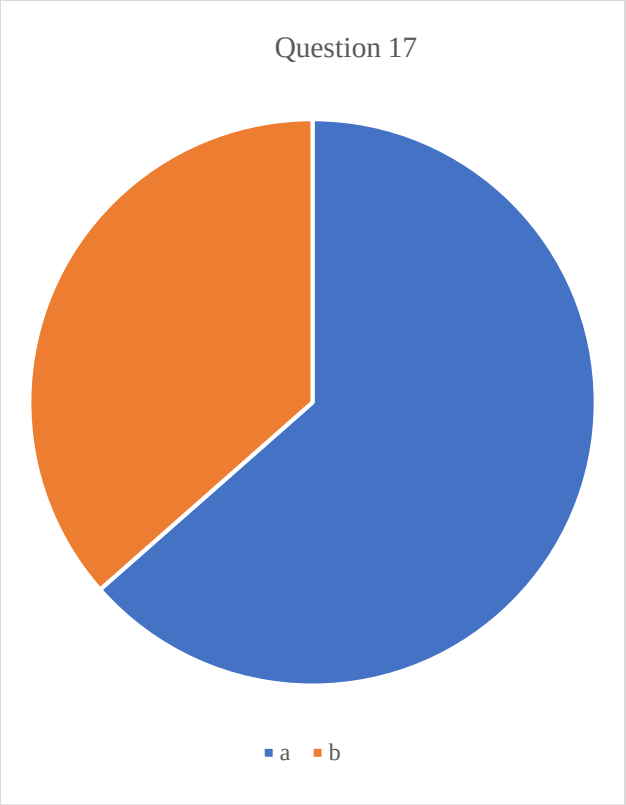
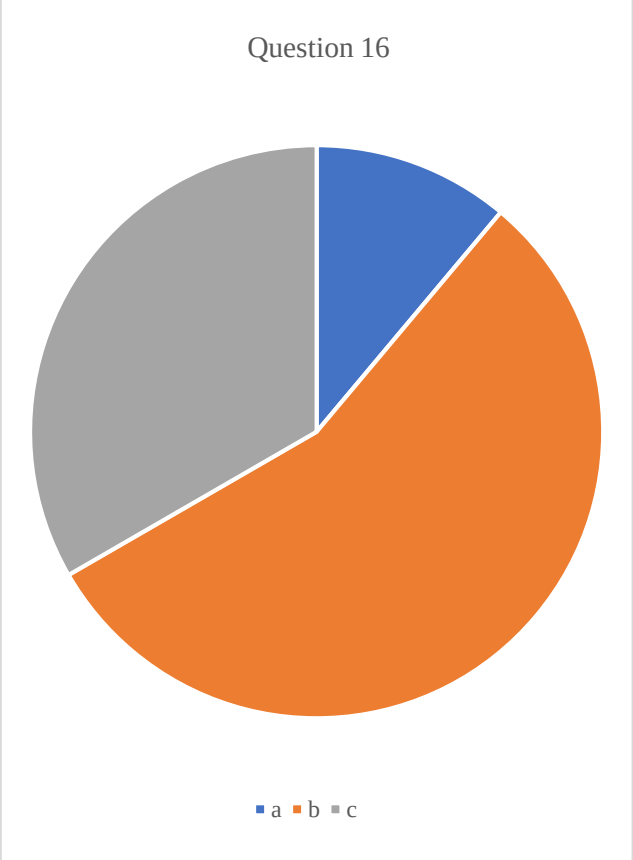

Question 15
a
b


Question 17
a
b


Question 16
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b
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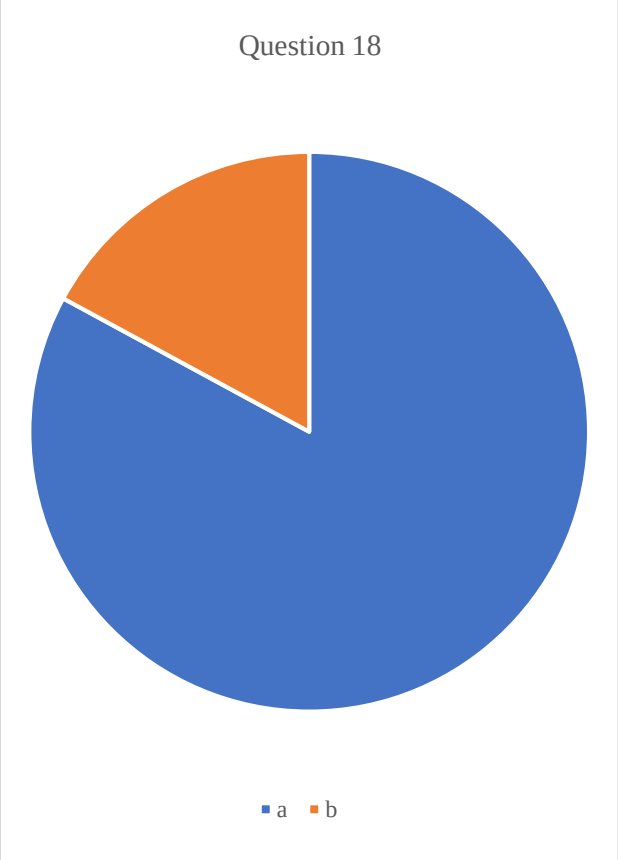
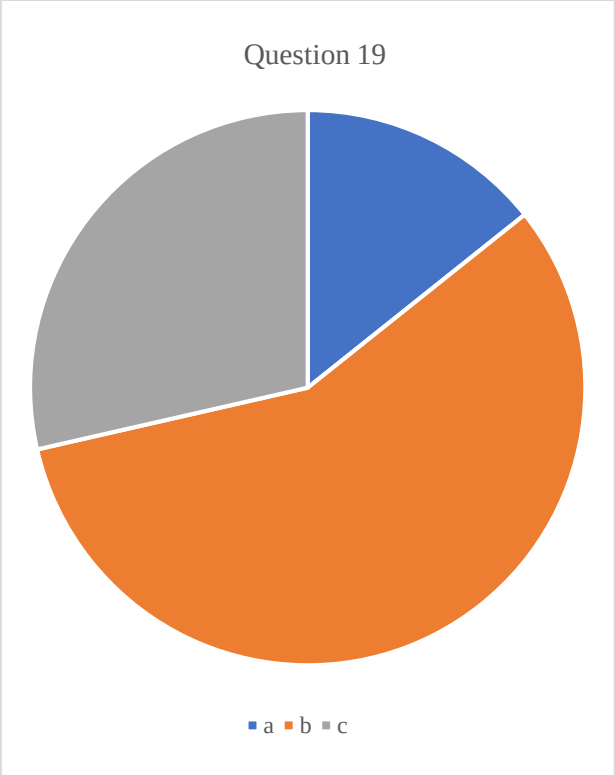

Question 18
a
b


Question 19
a
b
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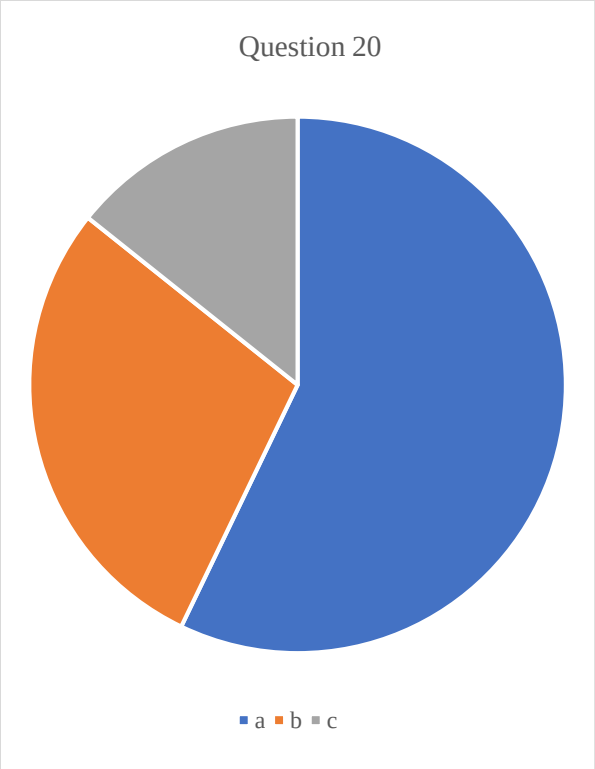
Question 20
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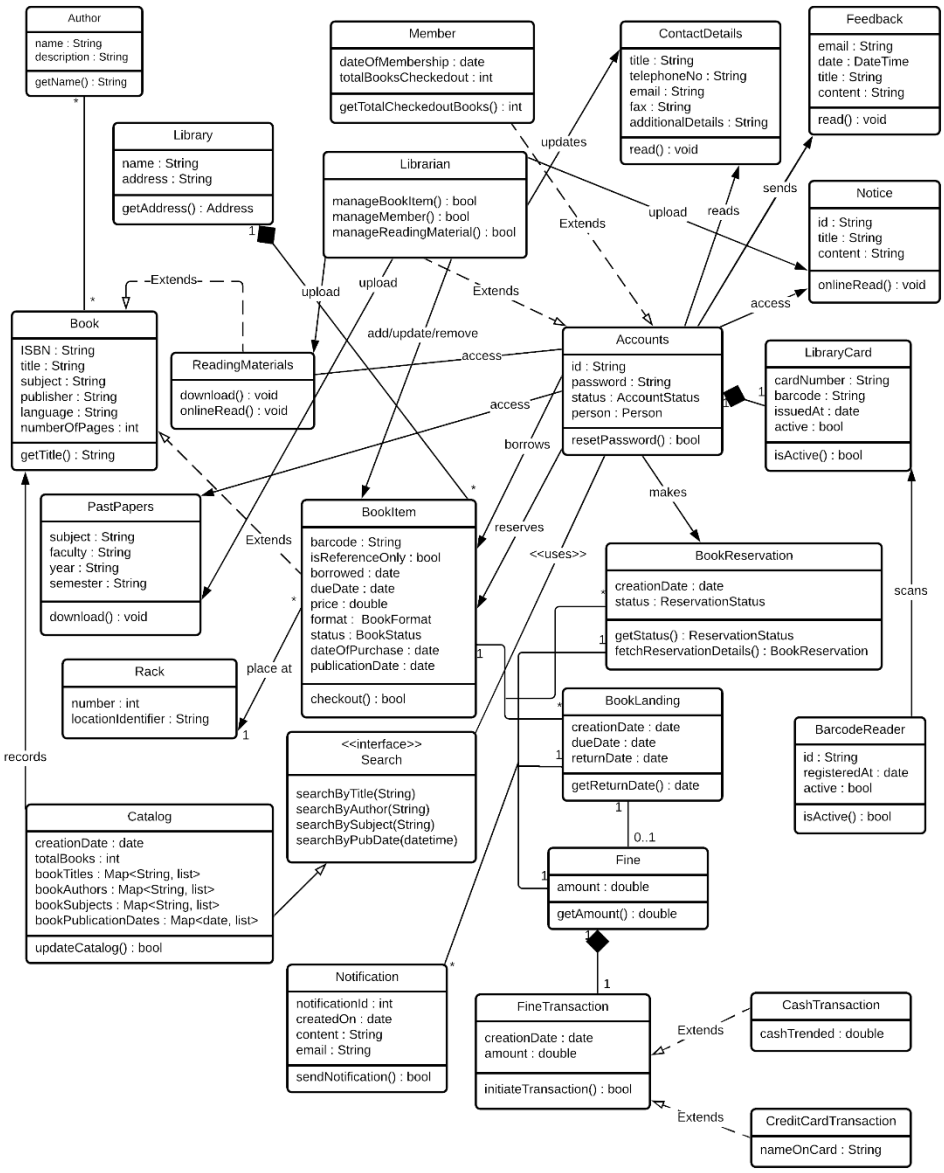
4. Proposed Solution / Systems Design

4.1 Class Diagram



Here are the main classes of our Library Management System:

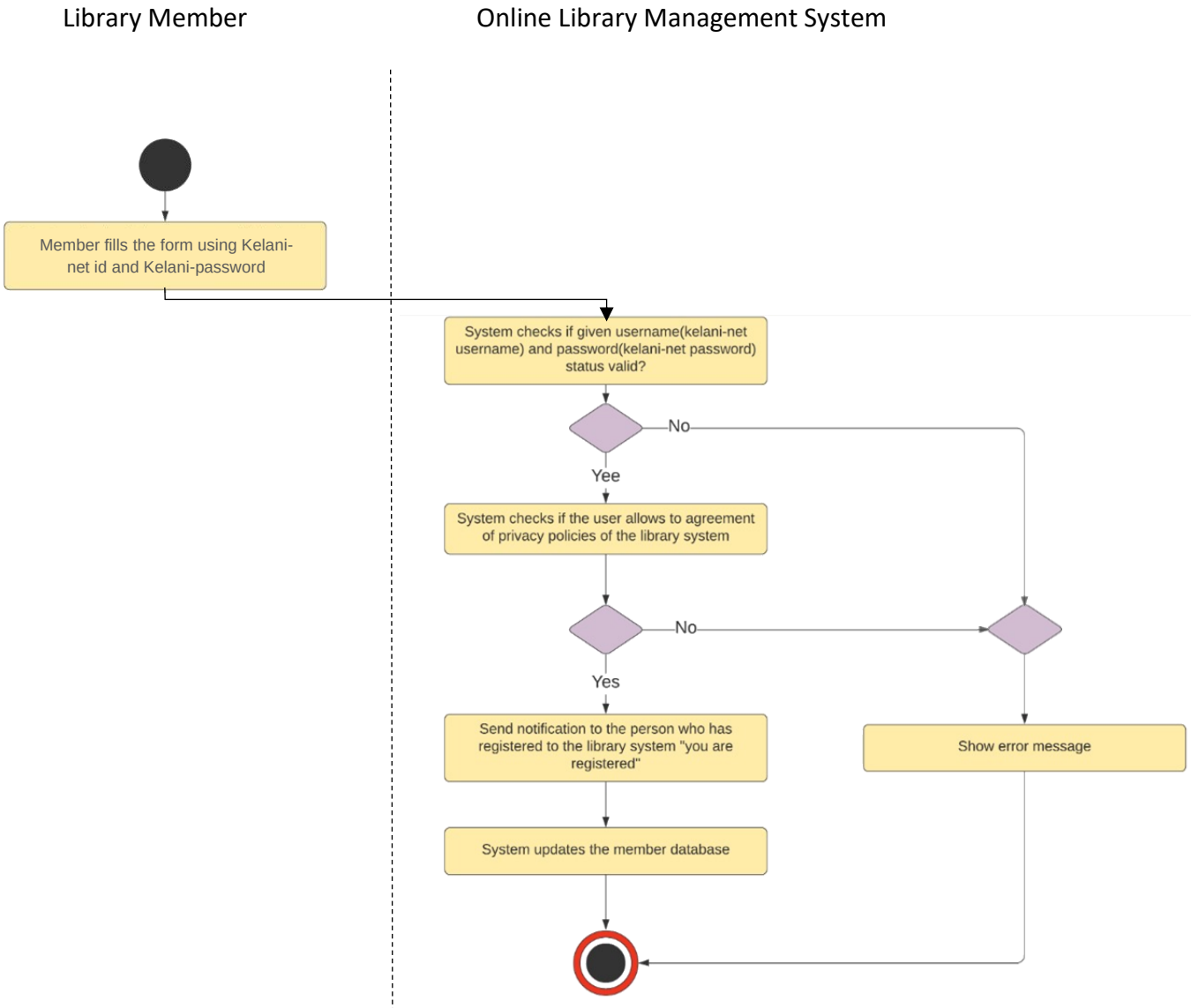
- Library:
    - The central part of the organization for which this software has been designed. It has attributes like ‘Name’ to distinguish it for many other libraries and ‘Address’ to describe its location.

- Book:
    - The basic building block of the system. Every book will have ISBN, Title, Subject, Publishers, etc.
- BookItem:
    - Any book can have multiple copies, each copy will be considered a book item in our system. Each booking item will have a unique barcode.
- Account:
    - We will have two types of accounts in the system, one will be a general member, and the other will be a librarian.
- LibraryCard:
    - Each library user will be issued a library card, which will be used to identify users while issuing or returning books.
- BookReservation:
    - Responsible for managing reservations against bookitems.
- BookLending:
    - Manage the checking-out of book items.
- Catalogue:
    - Catalogues contain the list of books sorted on certain criteria. Our system will support searching through four catalogues: Title, Author, Subject, and Publish-date.
- Fine:
    - This class will be responsible for calculating and collecting fines from library members.
- Author:
    - This class will encapsulate a book author.
- Rack:
    - Books will be placed on racks. Each rack will be identified by a rack number and will have a location identifier to describe the physical location of the rack in the library.
- Notification:
    - This class will take care of sending notifications to library members
- Notice:
    - This class represents the notices of the university. These notices can be uploaded by librarian and those can be seen by any users.
- PastPapers:
    - Past papers of all the courses in all faculties are represented by this class. Past papers are uploaded by librarian and any users can be downloaded them.
- ReadingMaterials :
    - E-Books and E-Journals are belonging to this class. These are recommended automatically for students who follow related courses.
- Feedback:
    - This class represents the feedback for any services of the library. Any users can send feedbacks.

4.2 Activity diagrams for new functionalities

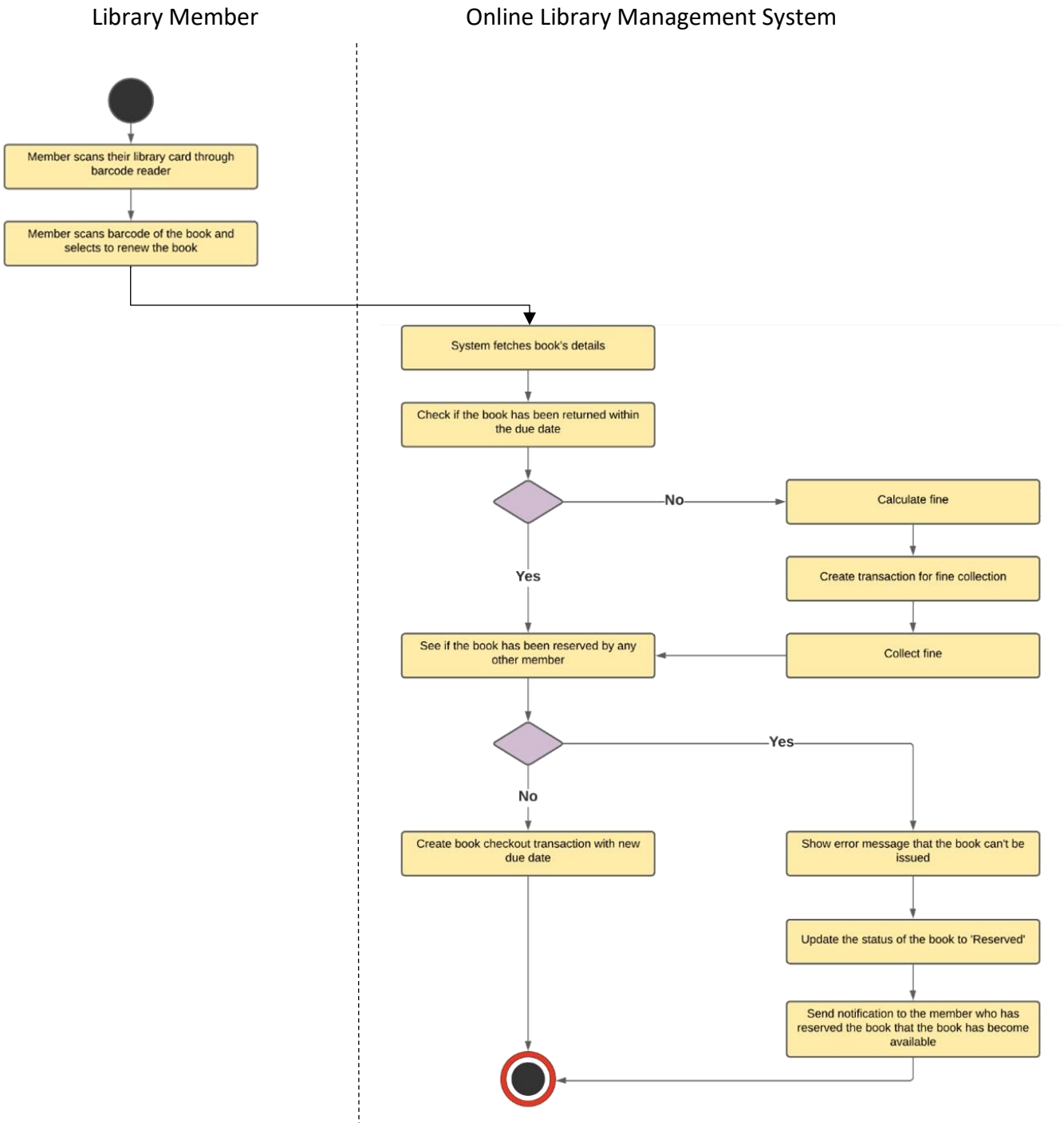
4.2.1 Library members register to the system

Any undergraduate/academic staff member/non-academic staff member able to register with their valid Kelani-net username and the Kelani-net password and the status. And he/she should able to agree to the agreements and the privacy policies before register to the system.



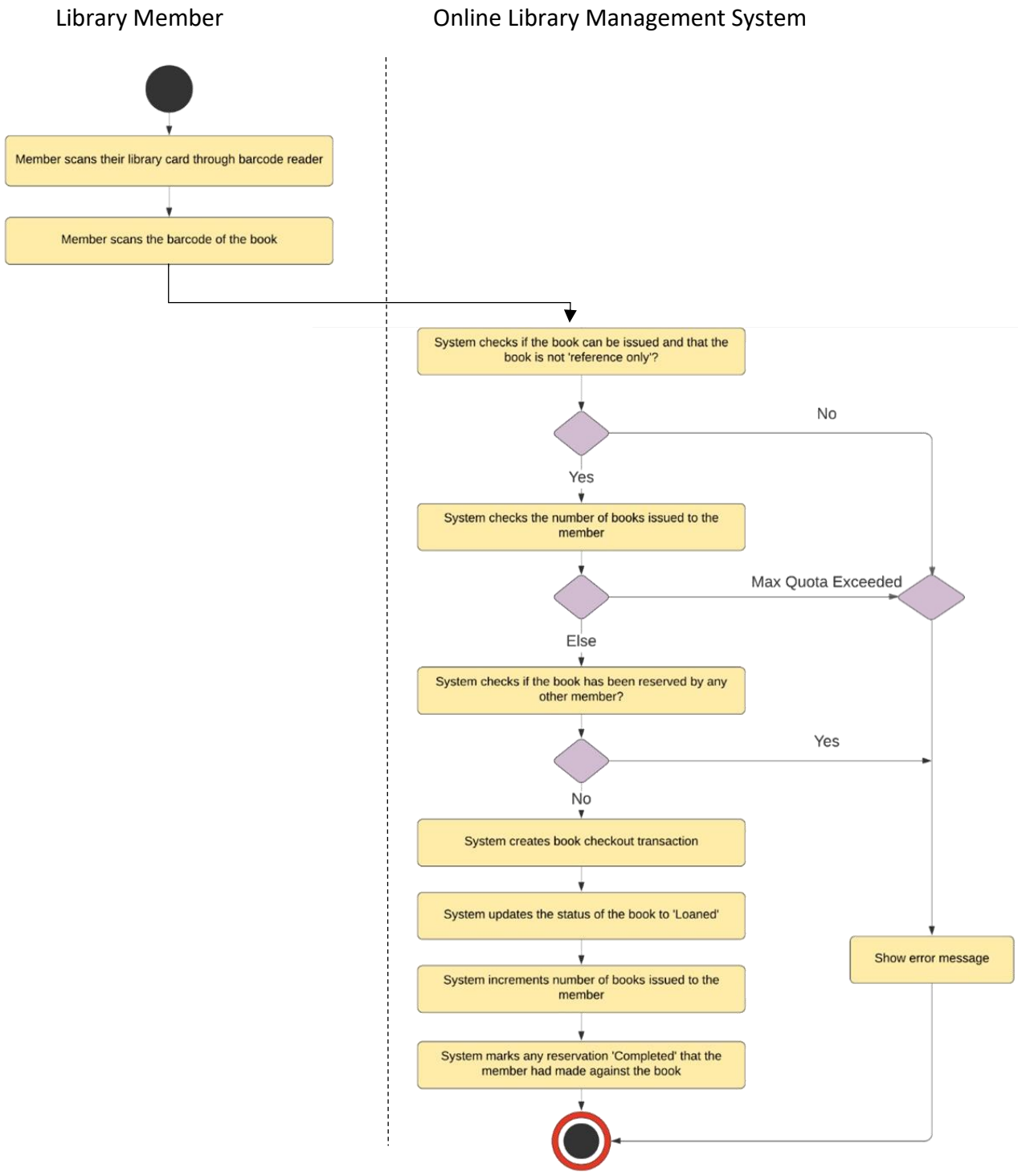
4.2.2 Renew a book

While renewing (re-issuing) a book, the system will check for fines and see if any other member has not reserved the same book, in that case, the book item cannot be renewed. Here are the different steps for renewing a book.



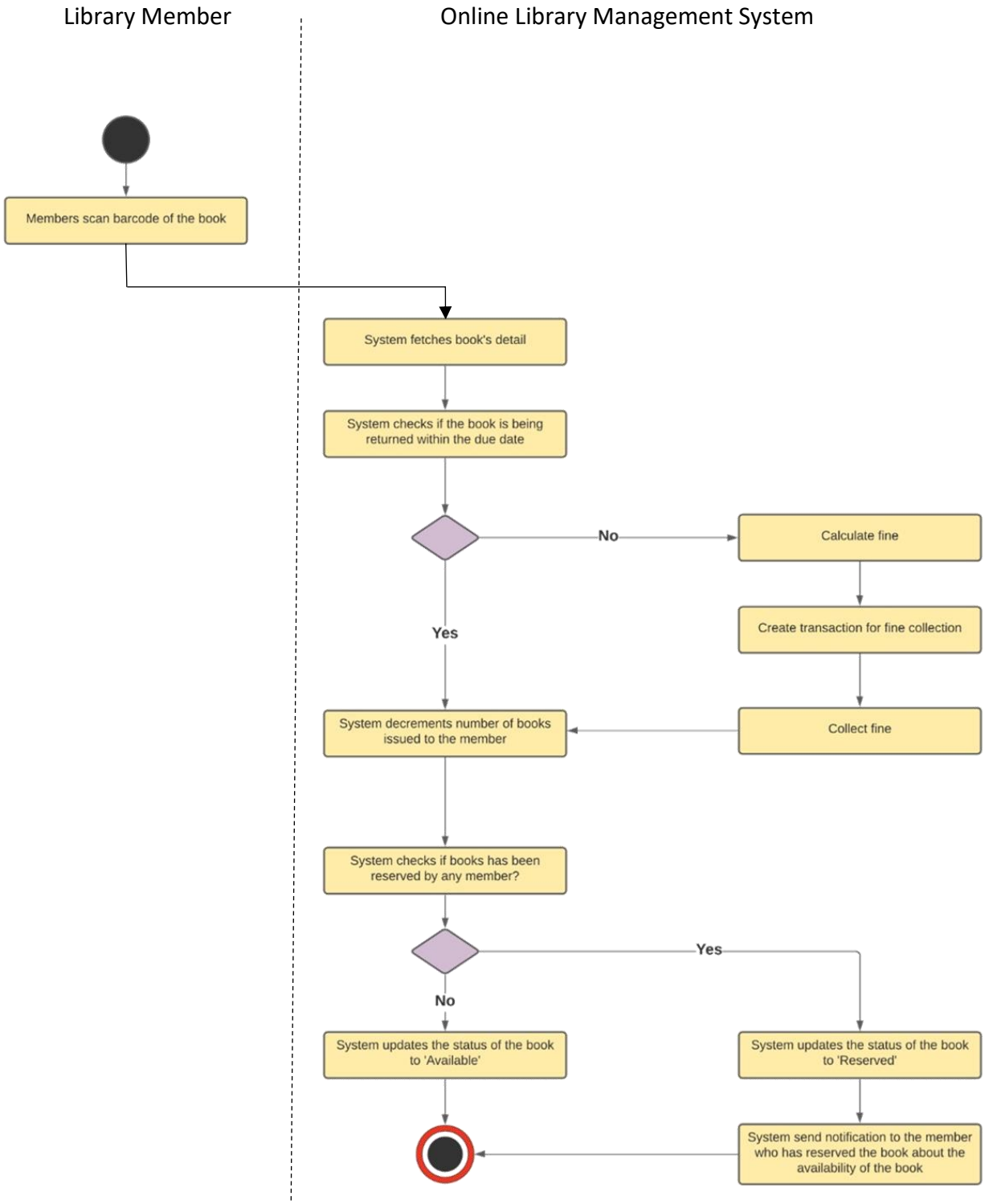
4.2.3 Check-out a book

Any library member or librarian can perform this activity. This the set of steps to check-out a book.



4.2.4 Return a book

Any library member or librarian can perform this activity. The system collects fines from members if they return books after the due date. Here are the steps for returning a book.



5. Future enhancements and conclusion

This library management system is fully web-based implementing system to interact with undergraduates, postgraduates, library staff, academic staff and non-academic staff. This implementation we are going to implement by using the MERN Stack. The reason what our team moved to the MERN Stack is describing by using the following advantages. The advantages of using MERN Stack are,

- **JavaScript:** One of the most important advantages of all is that developers can write their entire code in JavaScript from client to server. This is a blessing for JavaScript developers who have spent time and money learning JavaScript for client-side tasks.
- **Supports MVC** (Model View Controller) architecture.
- **Employability:** Employers around the world are looking for engineers who are familiar with JavaScript-based technology. Familiarity with the MEAN stack not only gives you a better view of the future but also makes it easier and more comfortable to migrate to other JavaScript technologies such as Backbone.JS.
- **Lower costs and faster delivery:** When entire coding projects in the MEAN stack, you no longer need to work in silos. This improves team communication, reduces productivity impact, and reduces friction. All of this reduces development costs and delivery times.
- **Flexible and well-designed apps:** Apps developed with the MEAN stack are not only highly optimized for performance but are also better suited for multi-device responsive design. In addition to this, coding using the MEAN stack gives designers more freedom and reassures a very flexible JavaScript stack.
- **Speed:** When benchmark performance flattens, Node.JS wins heavy hits like Apache! An event-driven architecture will help. And the amount of optimization and development that we have witnessed thanks to Google, Microsoft, etc. will help.
- **OS Independence:** Many old favourites, such as the LAMP stack, restricted the developer's choice of OS to Linux. On the other hand, the future of the MEAN stack points to an OS-independent development framework that works similarly on Windows, macOS, and Linux.

As in the future, we hope to add the functionalities of those who academic staff and non-academic staff members and we hope to host this implementation on the cloud-based platform. (Microsoft Azure) And this web-based application is not much compatible with mobile view. So that we hope to develop a mobile application in the future to compatible with Android, macOS.

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7. Appendix

7.1 Questioner questions (Results from elicitation - Students)

This is the questioner which is done by using Google Forms.

1. Choose your faculty?
    a. Faculty of Computing and Technology (FCT)
    b. Faculty of Science (FOS)
    c. Faculty of Commerce and Management (FOM)
    d. Faculty of Art (FOA)
2. Choose your year?
    a. 1st Year
    b. 2nd Year
    c. 3rd Year
    d. 4th Year
3. Are you currently registered member of university library?
    a. Yes
    b. No

4. If No, do you like to register the library?
    a. Yes
    b. No

Please tick one box in the row to assess your level of satisfaction with following aspects of your stay.

	Very satisfied	Satisfied	OK	Dissatisfied	Very dissatisfied
5. Is rate you satisfy about current library management system?					

6. Can you easily recognize available books?
    a. Yes
    b. Sometimes
    c. never
7. Are you capable to calculate fine of late books?
    a. Yes, but hard
    b. Yes, it’s easy

c. No

8. Do you think the system should show how calculations are made (Transparency)?
    a. Yes
    b. No
9. Are you facing any problems with search books in current library management system?
    a. Yes
    b. Sometimes
    c. Never

Please tick one box in the row to assess your level with following aspects of your stay.

	Extremely difficult	Difficult	Neutral	Satisfactory	Not difficult
10. Rate your difficulty to perform a search in the current library management system?					

11. Do you prefer to scan the bar code to search for books?
    a. Yes
    b. No
12. Do you think current library management should be upgraded to a new online Realtime library management system?
    a. Yes
    b. No
    c. No idea
13. Do you prefer a mobile application for your library?
    a. Yes
    b. No
14. Do you feel that your library account is a threat to your privacy?
    a. Yes
    b. Sometimes
    c. No
15. What do you feel about register to library management system online?
    a. Excellent
    b. Good
    c. Not good

Please tick one box in the row to assess your level of agree with following aspects of your stay.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
16. Are you agree to pay fine using credit cards?					
17. will you agree to allow the app to use cookies to personalize your view in the application?					

18. will you permit library app to push notification to you?
    a. Yes
    b. No

Please tick one box in the row to assess your level of agree with following aspects of your stay.

	Never	Rarely	Sometimes	Always	Often
19. Which of following describe how many times you physically visited to library?					

20. What changes must make you to engage more with the library?

7.2 Questioner for active review

1. What do you think about using messenger chatbot in the library system?
    a. It's very helpful
    b. It's unnecessary
    c. No idea
    d. Other ideas

2. What do you use to connect internet?
    a. Mobile data
    b. Wi-Fi

3. If you use mobile data do you have 4G access?
    a. No
    b. Yes

4. Do you think 360 view video loads over your connection?
    a. yes
    b. sometimes
    c. No

5. Will you reserve books online without physically visit the library?
    a. Yes
    b. No, prefer to physically visit the library

6. Are you going to allow the app to push notifications?
    a. Yes
    b. No

7. Are you trust online payment gateways?
    a. Sure
    b. No
    c. It depends

8. Have you used online payments to university purposes?
    a. Yes
    b. No
    c. Only once

9. Can you trust the university library management system's online payment system?
    a. Yes
    b. No
    c. Need more details

10. What level of privacy do you expect from the system?
    a. Higher
    b. Lower
    c. None

11. Who can see your user account?
    a. Only me
    b. Librarian
    c. All users

12. Which devices you will use to access library app?
    a. Mobile phone
    b. Laptop
    c. Tablet
    d. Desktop

13. What do you think about the size of the application?
    a. It should be less than 100mb
    b. It should be between 100mb – 500mb
    c. Size doesn't matter

Response time *may refer to the time lag between an electronic input and the output signal which depends upon the value of passive components used.*

14. How much responsive time do you expect from the app?
    a. Less than one second
    b. Less than six second
    c. Responsive time is no concern

15. On what purpose librarian going to use this app?
    a. To generate analytical reports
    b. To manage the library easily
    c. To register users to the library
    d. Avoid users to come physically to the library

16. What language do you prefer to use when searching for books?
    a. Sinhala
    b. English
    c. Need to choose languages

17. Which types of books you prefer to read, eBooks or paper books?
    a. eBooks
    b. Paper books

18. Do you like to register to the library with the app?
    a. No
    b. Yes

19. Do you think you can engage more with the library with an online presence?
    a. No
    b. Yes
    c. Sometimes

20. What do you think about services that going to offer you from the library system?
    a. Great
    b. Good enough
    c. Not bad

7.3 Interview with Librarian

- **Question 1:** What kind of difficulties you have when using the existing system?
- **Answer 1:** We have a web system for our library. It has some features like publishing all the news of university, statistics of students, and publishing some kind of E-books. But the library book managing part is not developed yet. So, it is difficult to show more details about library books.

- **Question 2:** Does the existing system has a user management method?
- **Answer 2:** Yes. Three types of users can register through the website by submitting their details. Those are HOD/lecturer/staff, student and librarian. And also, our admins can add, remove, update users.

- **Question 3:** Can I know what kind of job roles are there in this library like a librarian, library staff?
- **Answer 3:** If I say one by one, there are several job roles. They are
    - Librarian
    - System manager
    - Cataloguing librarian
    - Senior technician
    - Acquisition manager
    - Library administrator
    - Principal technician
    - Senior tutor librarian

- Library assistant
- Library user
- University system admin
- Library system admin
- Publisher
- System suppliers

- **Question 4:** Is the existing system capable to display the availability and the number of copies of a specific book? And also, does it give details of a reservation, details of a borrowed or misplaced book, specifically?
- **Answer 4:** No. we are managing all the books manually and all the details are reported in physical documents. So, it is not possible to display the details of the books. And also, there is not any method to reserve books, because our LMS is not supporting to manage the books. So that system doesn't give any details of borrowed and misplaced books also. It is better to have these all the features in the new system.

- **Question 5:** Then what about the online materials?
- **Answer 5:** We are uploading E-Books already and students can access them. But we have planned to upload past papers. Academic staff should be able to upload E-Books and past papers.

- **Question 6:** Does your system provide facilities to the users or to check their borrowing history?
- **Answer 6:** No. Users have their profiles, but we cannot upload their borrowing details one by one and it is not possible to update their histories.

- **Question 7:** How about fines and is there any method of information about a late returning of a book and the fine details for the late returning like emailing?
- **Answer 7:** Now we are calculating all the fines manually. But it is better to have that feature in the new system. We are informing them when they are coming to the library next time. If they are too late, we are sending letters to their home addresses.

- **Question 8:** How do the users are paying fines? Is there an online payment method?
- **Answer 8:** No. They are coming to the library and pay to the library staffs. Online payment is better. But if some students cannot pay online, they should be able to pay manually.

- **Question 9:** Is it better to have an informing method for users about a newly added book to the library?
- **Answer 9:** Yes. If there is a way like that it is very helpful for students because some students are asking for some books which are not in the library.

- **Question 10:** Is this existing system, is there chatting system for users to ask questions and get answers?
- **Answer 10:** Users can send their feedback through the website. But users cannot chat with library staff. It means it is oneway communication. Users cannot get answers from library staff.

7.4 Screenshots of the existing system

These screenshots are main areas of the existing library website at the University of Kelaniya.
(**URL -** https://library.kln.ac.lk/)

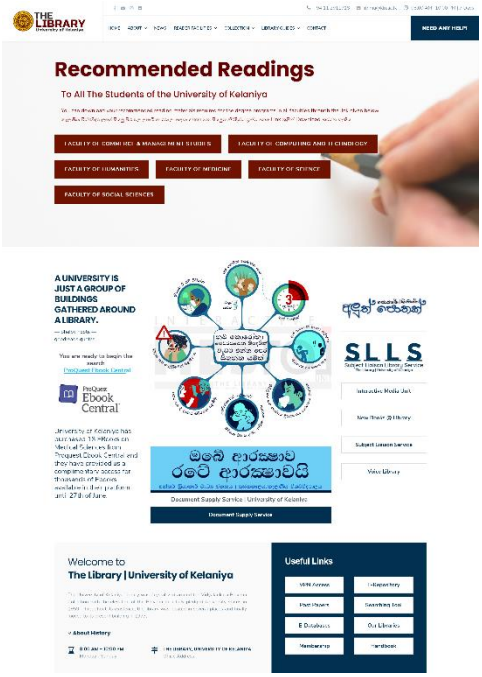

Figure 1: Screean shot of the home page

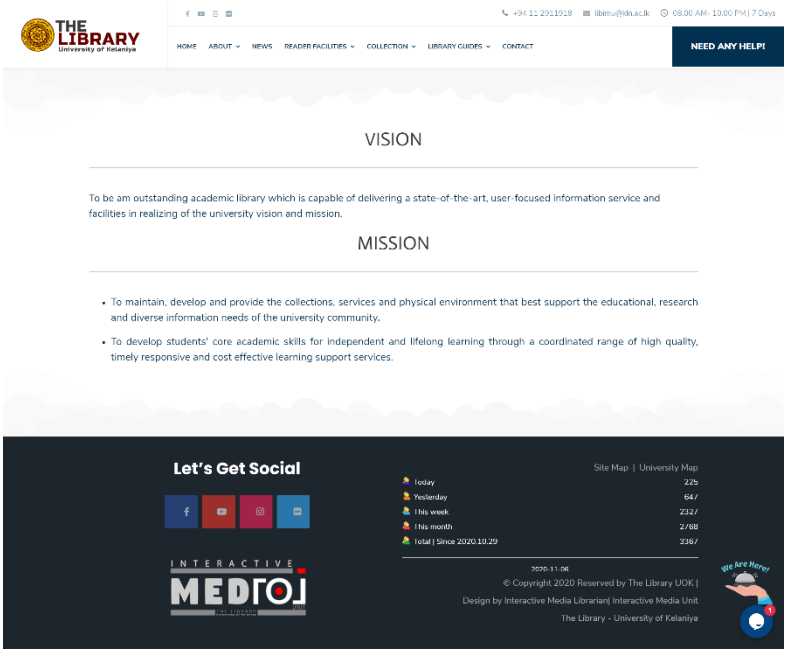

Figure 1: Screean shot of the vision and mission page

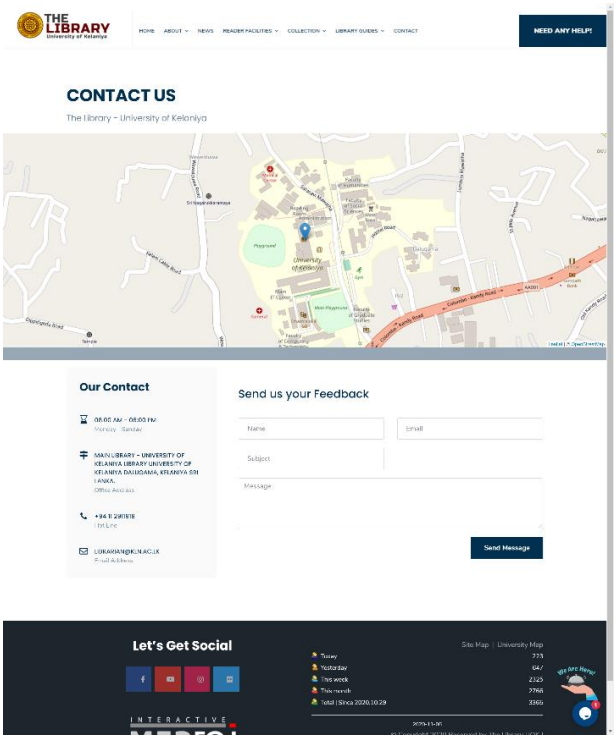

Figure 1: Screean shot of the contact page

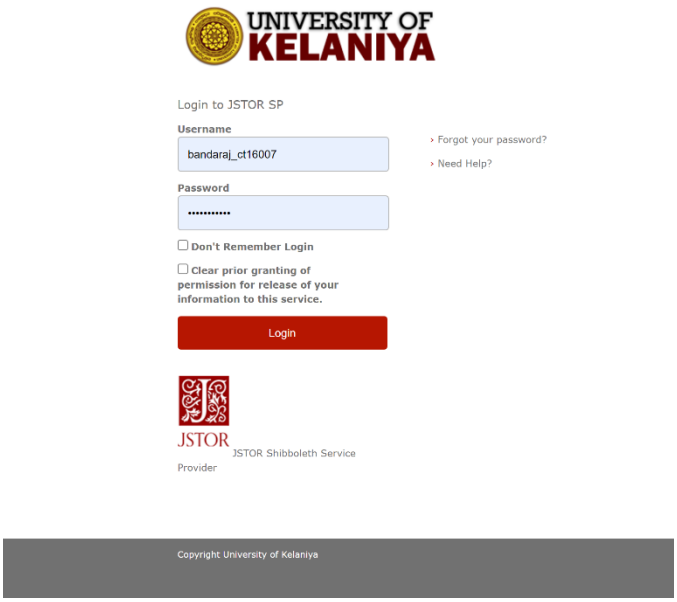

Figure 1: Screean shot of the login page

7.5 Workload matrix

This shows the contribution of the team members for each area of the SRS.

Task	Contributor
1. Introduction	
1.1. Introduction to the website	K.V.B. Hulangamuwa V.S. Amarasinghe
1.2. Vision and mission	
2. Requirement Elicitation / Systems Analysis	
2.1. Stakeholder analysis	J.M.C.M. Bandara K.V.B. Hulangamuwa W.V.S.K. Vithanage
2.2. Requirement elicitation plan	
2.3. Results of elicitation	
2.3.1. Statistics of the questioner	
2.3.2. Statistics of the interview	
2.4. System Requirement Specification	
2.4.1. Functional Requirements	
2.4.2. Non-functional requirements	
2.5. Use Case diagram to model the requirements	V.S. Amarasinghe W.V.S.K. Vithanage J.M.C.M. Bandara
2.5.1. A use case diagram for an existing library	
2.5.2. A use case diagram for the proposed library management system	
3. Requirement Validation and verification	
3.1. Justification for the tools/techniques selected	J.M.C.M. Bandara K.V.B. Hulangamuwa W.V.S.K. Vithanage
3.1.1. Requirement review	
3.2. Results of validation and verification	
3.2.1. Revised functional requirements	
3.2.2. Active review results	
4. Proposed Solution / Systems Design	

4.1. Class Diagram	W.V.S.K. Vithanage V.S. Amarasinghe
4.2. Activity diagrams for new functionalities	
4.2.1. Library members register to the system	V.S. Amarasinghe
4.2.2. Renew a book	J.M.C.M. Bandara
4.2.3. Check-out a book	V.S.K. Vithanage
4.2.4. Return a book	K.V.B. Hulangamuwa
5. Future enhancements and conclusion	J.M.C.M. Bandara V.S. Amarasinghe
6. References	K.V.B. Hulangamuwa V.S. Amarasinghe W.V.S.K. Vithanage J.M.C.M. Bandara
7. Appendix	
7.1. Questioner Questions (Results from elicitation - students)	V.S. Amarasinghe K.V.B. Hulangamuwa
7.2. Questioner for active review	
7.3. Interview Questions	J.M.C.M. Bandara W.V.S.K. Vithanage
7.4. Screenshots of the existing system	
7.5. Workload matrix	J.M.C.M. Bandara
8. Other	
○ Document finalizing	J.M.C.M. Bandara