K. J. Somaiya College of Engineering, Mumbai-77

(Autonomous College Affiliated to University of Mumbai)

Batch: A2 **Roll No.: 1911027**

Experiment / assignment / tutorial No. 1

TITLE: Requirement Specification Document for Mini Project

AIM: To learn and understand the way of analysing the gathered information in the previous phase for the development process and prepare requirement specification document. Concept of software engineering.

Expected Course outcome of Experiment:

Process of gathering requirements and converting them into specifications. Document created will be used by both, the customer and the developer, to understand WHAT is going to be developed.

Books/ Journals/ Websites referred:

1. Roger Pressman, Software Engineering: A practitioners Approach, McGraw Hill, 2010 ,6th edition
2. Ian Somerville, Software Engineering , Addison Wesley,2011,9th edition
3.http://en.wikipedia.org/wiki/Software_requirements_specification

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Pre Lab/ Prior Concepts:

Requirements analysis in systems engineering and software engineering, encompasses those tasks that go into determining the needs or conditions to meet for a new or altered product, taking account of the possibly conflicting requirements of the various stakeholders, such as beneficiaries or users. It is an early stage in the more general activity of requirements engineering which encompasses all activities concerned with eliciting, analyzing, documenting, validating and managing software or system requirements.

Requirements analysis is critical to the success of a systems or software project. The requirements should be documented, actionable, measurable, testable, traceable, related to identified business needs or opportunities, and defined to a level of detail sufficient for system design. Conceptually, requirements analysis includes three types of activities:

- **Eliciting requirements**: the task of identifying the various types of requirements from various sources including project documentation, (e.g. the project charter or definition), business process documentation, and stakeholder interviews. This is sometimes also called requirements gathering.
- **Analysing requirements**: determining whether the stated requirements are clear, complete, consistent and unambiguous, and resolving any apparent conflicts.
- **Recording requirements:** Requirements may be documented in various forms, usually including a summary list and may include natural-language documents, use cases or process specifications.

New systems change the environment and relationships between people, so it is important to identify all the stakeholders, taken into account all their needs and ensure they understand the implications of the new systems. Analysts can employ several techniques to elicit the requirements from the customer. These may include the development of scenarios, the identification of use cases, the use of workplace observation or ethnography, holding interviews, or focus groups (more aptly named in this context as

requirements workshops, or requirements review sessions) and creating requirements lists. Prototyping may be used to develop an example system that can be demonstrated to stakeholders. Where necessary, the analyst will employ a combination of these methods to establish the exact requirements of the stakeholders, so that a system that meets the business needs is produced

Different types of Requirements

- Functional requirements
- Usability requirements
- Reliability requirements
- Performance requirements
- Security requirements

K. J. Somaiya College of Engineering, Mumbai-77

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Software Requirements Specification for:

GPS Based Self attendance system

Version 1.0

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K.J. Somaiya college of engineering

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Introduction

Over the years, several solutions have been developed to record the attendance of the students. The most popular of these is traditional manual attendance tracking systems. Each of these options has its disadvantages. In recent decades, schools have slowly begun to integrate software and modern clock terminals to better track the attendance of students along with the reduction in complexity and time consumption of the manual attendance system. Maintaining the attendance record with day-to-day activities is a challenging task. The conventional method of calling the name of each student is time-consuming and there is always a chance of proxy attendance. The following system is based on face recognition to maintain the attendance record of students.

Purpose

To facilitate a smooth and efficient way of recording the attendance of a student for a lecture from his/her smartphone if the location of the student is within the mentioned radius of the college. Any school, college, or university, either large or small, requires an attendance tracking system for effective maintenance of activities and student's growth in studies. The management needs to have records of the attendance of each student to handle discrepancies. In today's competitive world, every technology has drastic improvements when automated. Since, manual attendance tracking is a tedious and inefficient process, the smart attendance management system with face recognition capabilities and GPS takes a huge leap in this scenario.

Product Scope

Objective:

In every higher education setting, there are concerns about student attendance, as the current process of manual attendance taking is not only

time-consuming but is also inaccurate. Inconsistent attendance in class may significantly affect students' overall academic performance. Thus, having a consistent attendance system is important. Attendance of the student is marked using face recognition and retrieves by student's location using GPS services. This project has a high potential to replace the current attendance system, as it is designed for speed and accuracy and is more convenient than the current approach. The objective of this project is to record the real-time attendance of students for a particular lecture by verifying their location. If the location corresponds to the set value for the college then the face of the student will be captured and after being verified from the database the student will be identified and attendance will be recorded.

Benefits:

- It saves time for manual attendance
- A contactless attendance solution is provided.
- Saves the hardware and software requirements of smart attendance system wherein webcams would have been required for each classroom
- Saves time required to capture the face of every student by and recognize them followed by marking the attendance
- Ensures that no student can mark the attendance of any classmate and that attendance isn't marked from any location.
- No biometric machines are required as attendance will be marked by mobile phone only.
- This system can be implemented with low investment as a bunch of good developers can easily build the system.

References

[1]https://www.researchgate.net/publication/330129_Smart_Attendance_System
[2]https://ieeexplore.ieee.org/document/9215441
[3]https://www.researchgate.net/publication/309722042_Attendance_System_Using_a_Mobile_Device_Face_Recognition_GPS_or_Both

Overall Description

Product Perspective

This project aims to create an attendance system that allows students to record their attendance using their mobile device, with the help of face recognition technology and a GPS locator. Our proposed attendance system does not require any kind of peripheral device other than students' smartphones, thereby reducing computational time and avoiding the cost of placing physical devices in classes. The primary objective of the program is to be able to take attendance using students' mobile devices without inaccuracy. For the project to succeed, it must employ a location tracker and face recognition to deliver a reliable attendance system. Face recognition requires the student to have direct interaction with the device, while the GPS locator specifies the device's location. Since a student can use their mobile device, which they can bring anywhere, the system offers excellent mobility.

Current trend:

1. The traditional markings are now viewed as obsolete and redundant. It is substituted in the tech buzz arenas by automatic Attendance Management Systems and software that not only save time and energy but also reduce manual effort and error.
2. Wi-Fi-enabled Attendance Tracking Systems can support record keeping of the time and attendance of a big amount of staff. This scheme leverages biometric technology to help ensure time punching precision. In turn, this will foster greater power and precision.
3. Biometric Kiosk is an android based touch screen system. It permits staff to verify work schedules, review their time schedules, and also can request time off. The staff will be simply able to scan present job listings and different options.

Future Scope:

1. In this era of hacking it will be very much difficult to provide full-fledged security to users on the internet while logging into any website. So this system can be used for login systems as well. Instead of username and password, the user's face can be used as an identifying parameter.
2. This concept is still not user-friendly with the people working in small-scale industries, but in the future, everyone would be well equipped with mobile phones. So this system can be easily used for small-scale industries as well.

Product Functions

- **Student registration:** Students have to register themselves so that their name and face features can be stored which then will be useful for attendance marking. This part must be done under the strict supervision of the professor so there will not be any discrepancy.

- **Teacher registration:** Teachers must register themselves to schedule lectures whose attendance will be taken by the system. This registration must be under strict supervision to avoid discrepancies. Mail id of the teacher must be given so that all the attendance sheets will be mailed.

- **Teacher login:** Whenever a particular teacher wants to take attendance for a particular lecture that lecture must be scheduled in the system as well and for that teacher must be logged in to the system. The login credentials will be available to the teacher during registration.

- **Lecture schedule:** The teacher will be logging in with the help of login credentials and can schedule lectures. After scheduling the

lecture a unique code will be provided to the teacher this code will be useful for students to mark attendance.

- **Marking attendance:** Whenever a teacher creates a lecture all the students will be able to see that lecture on the system. Students can mark themselves present by entering the code given by the teacher (code which is generated on lecture scheduling). Students' location will be tracked and if it is in the specified area then students just have to keep the camera of the phone in front of themselves and the system will do its job and student's attendance will be marked. This record will be stored in the database for that lecture.

- **Attendance retrieval:** When a lecture is ended teacher will again log in. The teacher will now be able to get attendance. This attendance will be in the form of excel and this attendance sheet will be mailed to the teacher.

Operating Environment

- Android mobile phone with the version above 6.0.
- Stable internet connection.
- GPS of the phone must be in working condition.
- The mobile phone must have a camera without any destruction.

Design and Implementation Constraints

OS support:

- Android 5.0 and above
- iOS 11 and above

Security:

- Teachers login credentials must be accessed only by the admin or teacher
- Students details should be stored securely
- Students' details should be accessed only by the admin.

User Documentation

These are the systems that are somewhat the same as we have thought of designing so documentation and features sets are almost the same.

https://unolo.com/?gclid=Cj0KCQjwg7KJBhDyARIsAHrAXaFP26Wk3KknA96tK6zkQ4r7yRzQpYLFbUBc83fQmkyv7WnnqVUF_s8aAgmfEALw_wcB

https://truein.com/face-attendance-demo/?utm_source=google&utm_medium=ppc&utm_campaign=Ad31_3-3-2_face_recognition_attendance_app&gclid=Cj0KCQjwg7KJBhDyARIsAHrAXaE2KI29ge9bc6ZNjtn6yQXh-eNFZn1iIHp9fOLA97aEjp_YWdmbyeMaAkNvEALw_wcB

Assumptions

- Students and teacher have a stable internet connection.
- Students are under strict supervision while marking their attendance.
- User has any of the following Operating Systems listed above.
- The unique code provided by the teacher is only accessible to students sitting in the classroom.

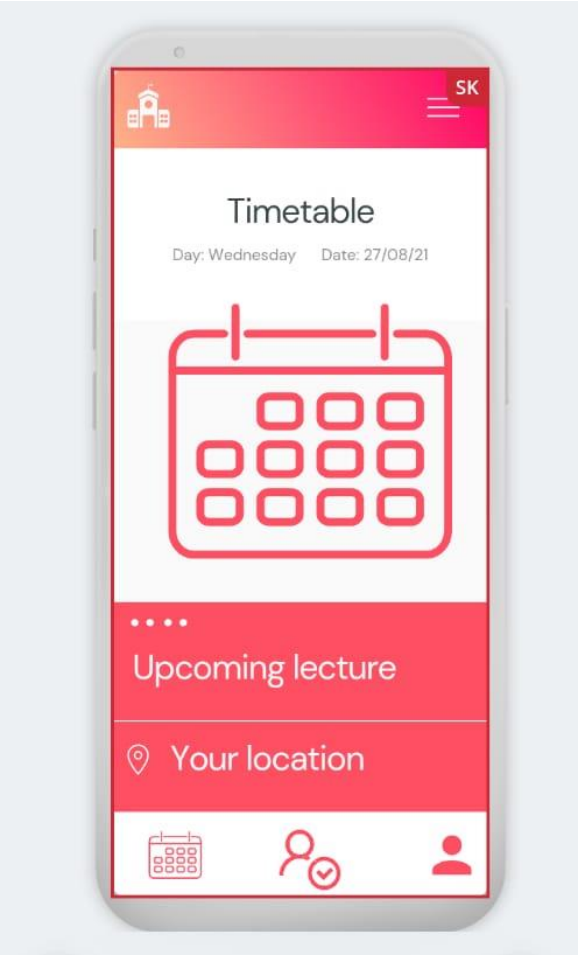
Dependencies

Cloud computing service

- For storing student's confidential data.
- For storing attendance of the students temporarily.

External Interface Requirements

User Interfaces



The software requirements a user requires to mark his/her attendance is nothing but a smartphone with an internet connection and a working camera. This not only reduces the software requirements as compared to other ways of recording attendance but its time complexity.

Hardware Interfaces

- This system would be compatible with android and ios devices which would include only mobile devices.
- For Android and iOS devices a functioning touch screen is necessary.
- A working front-facing camera is capable of capturing reasonable images so that the image in the database and the current captured image match under correct circumstances.

Software Interfaces

When users log in through their respective university email, their device will be connected to the database of the institution, and every attendance that is marked gets stored in the database and after the lecture is completed the attendance is retrieved and a mail of the same is sent to the faculty

Communications Interfaces

- A mobile phone is required to transfer the data from the user's side to the admin/database side.
- A valid email address for each teacher is a must as the attendance would be sent to the teacher through the mail.
- SMTP protocol will be used to send an email.
- HTTPS protocol to transfer data via the internet to the database.
- Active internet connection would be necessary
- Location/GPS should be enabled at the time of attendance marking.

System Features

Students as well as teachers must be registered on the system to use the system features which are mentioned below.

Student registration

4.1.1 Description and Priority

For marking the attendance students must be registered so that they can be identified while marking the attendance. This process is a very much important process and it is of the highest priority and must be under strict supervision. If there is some discrepancy with registration then it will directly affect the student's attendance which is the main aim.

4.1.2 Stimulus/Response Sequences

Students have to meet the admin who will provide the details to start registration and then students have to follow the steps.

1. Students will provide their registration name and roll number.
2. Admin will start the system and students have to sit in front of the webcam of the laptop/computer of admin.
3. Students have to move his head in almost all directions so that every feature of a student is recognized and stored.
4. After the success message, the process will be over and a student has been registered successfully.

4.1.3 Functional Requirements

REQ-1: The background in which the images are taken must be clear.
REQ-2: The camera of the system should be in good condition so that there will not be any glitches in the system.
REQ-3: Stable internet connection is required to get a smooth ride in the process.

Teacher login

4.1.1 Description and Priority

For scheduling a lecture a teacher should be logged in with credentials. A successful login will allow the teacher to schedule lectures and also to retrieve lecture attendance.

4.1.2 Stimulus/Response Sequences

1. There will be a different section where teachers have to login.
2. The system will ask for the login credentials of the teacher.
3. The teacher must provide valid credentials to use different functions of the system.

4.1.3 Functional Requirements

REQ-1: Strong internet connection is required to reduce delay.

Lecture Scheduling

4.1.1 Description and Priority

After the teacher is logged in, they will get an option to schedule the lecture. This lecture then will be visible to students to mark the attendance. If all the details are specified correctly teacher will get a unique code which will be provided to the student to mark attendance.

4.1.2 Stimulus/Response Sequences

1. The teacher will be logging in to the system.
2. Lecture details will be specified and the teacher will schedule that lecture.
3. A unique code will be generated and that code will be given to students to mark attendance.

4.1.3 Functional Requirements

REQ-1: Internet connection is required for smooth conduction of process.

Marking Attendance

4.1.1 Description and Priority

Whenever the teacher schedules a lecture every student will be notified and students then will be able to mark attendance. Attendance will be marked for a particular lecture whenever the teacher gives a code to the students. Students will then start the system and the system will take attendance using face recognition and GPS. This operation will be of the highest priority as the main aim of the system is attendance marking.

4.1.2 Stimulus/Response Sequences

1. The teacher will schedule the lecture and a unique code will appear.
2. The teacher will share that code with students and students will enter that code in the system and they will now be able to take the attendance.
3. After entering the code the system will identify the location of the students and if it is in the specified area then mobile phones camera will be started and student's face will be recognized and attendance will be recorded.

4.1.3 Functional Requirements

REQ-1: Student's phones camera must be clear enough to record the attendance.
REQ-2: The GPS of the phone must be in working condition else the student will not be able to mark the attendance.
REQ-3: Stable internet connection is required so that smooth conduction of process will be carried out.

Extract Attendance from the system

4.1.1 Description and Priority

When the attendance of the students is marked sheet will be generated from the database and that sheet will be in Excel form. That attendance sheet will be mailed to the teacher so, the teacher can make a note of it. This function will be of high priority as the teacher must be aware of the attendance to track student's progress.

4.1.2 Stimulus/Response Sequences

1. After marking attendance teacher will again login and there he/she will be getting an option to retrieve attendance.
2. When the teacher will click on that option the attendance will be mailed to the teacher with a proper description of the lecture.

4.1.3 Functional Requirements

REQ-1: Student's phones camera must be clear enough to record the attendance.
REQ-2: The GPS of the phone must be in working condition else the student will not be able to mark the attendance.
REQ-3: Internet connection is required to mail the attendance else attendance will be stored in the system only.

Other Nonfunctional Requirements

Performance Requirements

- The system should be available during college hours for the students.
- The system must be fast and have a smooth and user-friendly interface that provides a quick response.
- There shouldn't be any delays during the execution of database queries when marking attendance.
- Internet connection must be sufficiently stable so that there will not be any delay in marking and sending of the attendance.

Safety Requirements

- Only the administrators can change the contents of the database else there will be some glitches in attendance records.
- Students which are the parts of the institution must be registered to mark the attendance else the system will not recognize and this will propagate to other disturbances in functionalities.
- The username and password and mail id of the teachers must be stored in a secured environment so there will not be any in the scheduling of lectures.
- Mail ids of the teachers must be appropriate else the attendance will be lost.

Security Requirements

- The database has to be secured so that there is no leak in the database.
- An authentication system has to be set up so that not everyone can access the database without a security check.
- HTTPS protocols are used for communication due to their secure nature.
- A security threat may be possessed if the user has a VPN on while using this system as it corrupts the database with false values.
- Data Privacy Policy(IAPP) : This policy ensures that the data of user i.e his/her photo, email, mobile number etc are not handled recklessly and are stored safely and securely.
- SMTP(Simple Mail Transfer Protocol) protocol: It is a standard protocol on a TCP/IP network for sending emails through servers from one computer to another

Software Quality Attributes

The testing of the complete workflow of the app application consists of:

- Registering the user
- Login and Signup options
- Capturing the image for further processing
- Updating the database
- Training the model on the new data received.
- Preparing the system for user validation and recognition.
- Marking attendance once the user is successfully recognized.

Some other functionalities which can be tested:

- **Testing for Mobile Responsiveness :** The responsive design must be tested to be sure that it works on multiple screen sizes.
- **Checking Compatibility with Android/IOS versions :** Different Android/IOS versions must be tested so that the app performs well on older versions too.

Business Rules

Registration of both students as well as teachers must be under strict supervision, any discrepancy will not be resolved by developers of the system. This system will be completely free to install on teachers phone and student's phones there will not be any charges. And all the rights to modify any data will go only through the admin.

Other Requirements

All the requirements have been mentioned above.

Post Laboratory Activity:

Complete the following activity

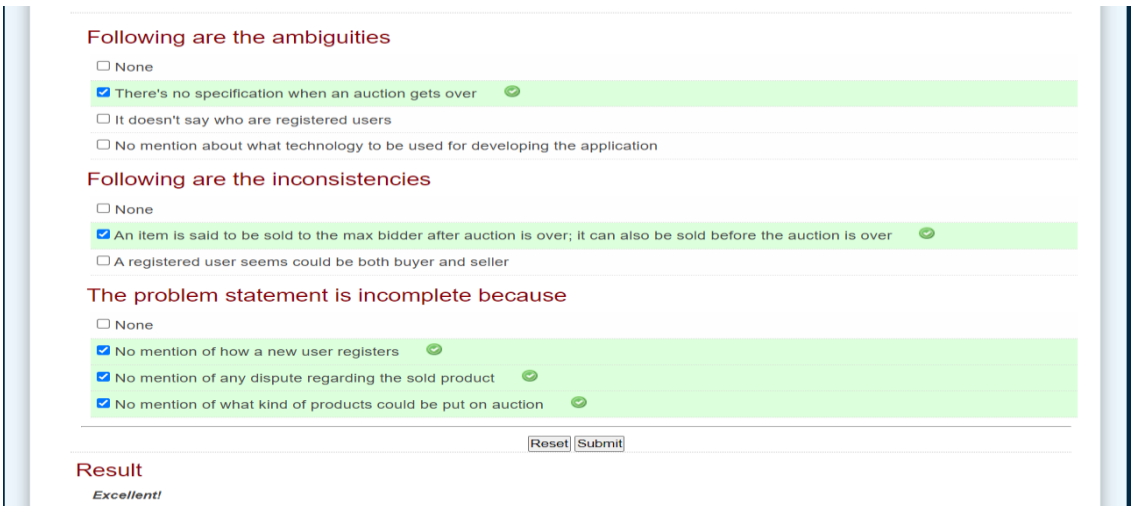
Virtual Lab Link: http://vlabs.iitkgp.ernet.in/se/1/exercise/
Introduction:
Requirements identification is the first step of any software development project. Until the requirements of a client have been clearly identified, and verified, no other task (design, coding, testing) could begin. Usually business analysts having domain knowledge on the subject matter discuss

with clients and decide what features are to be implemented. In this experiment we will learn how to identify functional and non-functional requirements from a given problem statement. Functional and non-functional requirements are the primary components of a Software Requirements Specification.

Case study:

Internet has led to discussion of e-democracy and online voting. Many peoples think that the internet could replace representative democracy, enabling everyone to vote on everything and anything by online voting .Online voting could reduce cost and make voting more convenient. This type of voting can be done for e-democracy, or it may be used for finalizing a solution, if many alternatives are present. Online voting make's use of authentication, hence it needs security, and the system must be able to address obtaining, marking, delivering and counting ballots via computer. Advantage of online voting is it could increase voter turnout because of convenience, and it helps to reduce fraud voting.

Exercise 1:



Exercise 2:

Following functional requirements could be obtained from the requirements specifications

- [x] Registration: New users have to register themselves online with the site and accept its terms & conditions
- [x] User Login: A user has to login into the site using his correct user ID & password
- [x] Upload Item for Auction: An authenticated user can upload an item into the site, which is to be put on auction subsequently
- [x] Auction Item: User puts an item already uploaded by him ino the site on auction
- [ ] Balance Check: Bidder should have enough bank balance to bid
- [x] Bid for Item: Any registered & authenticated user of the system could place a bid for an item on auction
- [x] Win Auction: After the auction is over, the maximum bidder for the item owns the item post payment
- [x] Ship Item: Seller of the item ships the item to the auction owner after he (seller) receives the payment
- [ ] Availability: The system should remain up & running before, during and after an auction
- [x] Remove item: Owner removes an item after uploading it, and doesn't put on auction
- [x] Remove auctioned item: System automatically removes an item from its inventory after it has been successfully auctioned
- [ ] Site Support: Customer care for the website should provide 24x7 help over phone

Reset Submit

Result

Excellent!

Exercise 3:

Following possible non-functional requirements could be identified from the requirements specifications

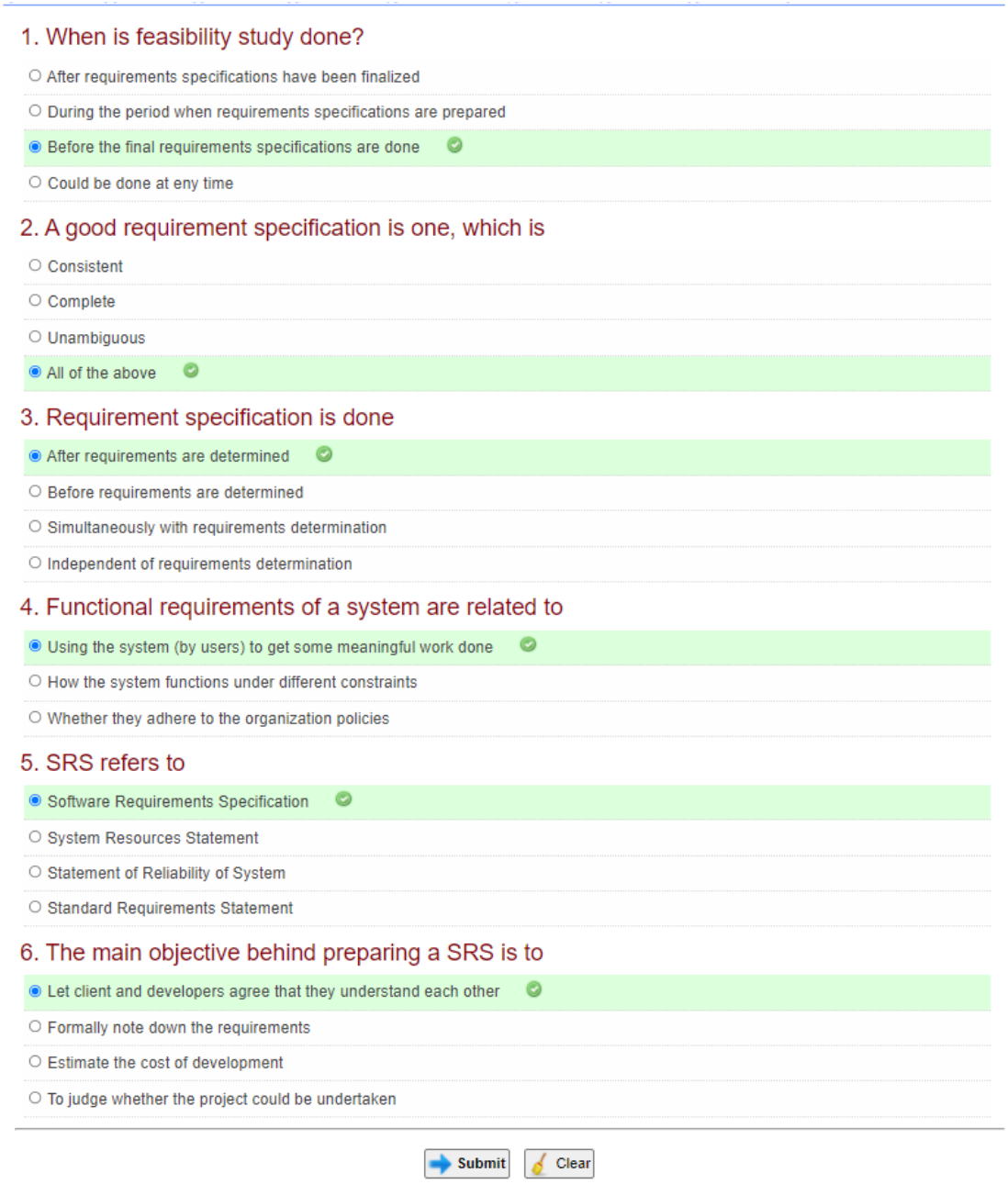
- [ ] The system provides option for online registration of new users
- [x] The system should remain up & running throughout it's working hours
- [ ] System automatially removes an item from its database after it has been successfully auctioned
- [x] Sessions of different users must not affect each other
- [ ] Customer care for the website should provide 24x7 help over phone
- [x] System should maintain privacy of their users and should not leak their information to third parties
- [x] System should be able to service 100 users simultaneously
- [x] System could remain unavailable for upto 2 hours for maintenance once in a quarter with 36 hour prior notice

Reset Submit

Result

Excellent!

Self Evaluation:



1. When is feasibility study done?
   - ○ After requirements specifications have been finalized
   - ○ During the period when requirements specifications are prepared
   - ◉ Before the final requirements specifications are done
   - ○ Could be done at eny time
2. A good requirement specification is one, which is
   - ○ Consistent
   - ○ Complete
   - ○ Unambiguous
   - ◉ All of the above
3. Requirement specification is done
   - ◉ After requirements are determined
   - ○ Before requirements are determined
   - ○ Simultaneously with requirements determination
   - ○ Independent of requirements determination
4. Functional requirements of a system are related to
   - ◉ Using the system (by users) to get some meaningful work done
   - ○ How the system functions under different constraints
   - ○ Whether they adhere to the organization policies
5. SRS refers to
   - ◉ Software Requirements Specification
   - ○ System Resources Statement
   - ○ Statement of Reliability of System
   - ○ Standard Requirements Statement
6. The main objective behind preparing a SRS is to
   - ◉ Let client and developers agree that they understand each other
   - ○ Formally note down the requirements
   - ○ Estimate the cost of development
   - ○ To judge whether the project could be undertaken

Submit Clear

Post Lab Descriptive Questions:

1. What are different techniques to gather information for software development?

ANS)

Ans) 1) Brainstorming :- Brainstorming is used in requirement gathering to get as many ideas as possible from group of people. Can generally used to identify possible solutions to problems, and clarifies details of opportunities.

2) Document analysis :- Reviewing the documentation of an existing system can also help to gather information. Nuggets of information are often buried in existing documents that help us ask questions as part of validating requirement completeness.

3) Focus group :- This groups are nothing but the gathering of people who are representative of the users or customers of a product to get feedback. This form of market research is distinct from brainstorming in that it is a managed process with specific participants.

4) Interview :- Interviews of stakeholders and users are critical for creating the great software. without understanding the goals and expectations of the users and stakeholders, we are very unlikely to satisfy them. We also have to recognize the perspective of each interviewee, so that we can properly weigh and address their inputs.

5] Observation :- By observing users an analyst can identify a process flow, steps, pain points and opportunities for improvement. observation can be either passive or active.

6] Prototyping :- It is relatively a modern technique for gathering requirements. Here with preliminary information initial version of the system is build called a prototype. Then it will be shown to the client and then additional requirements will be given by the client.

7] Requirement workshops :- Workshops can be very effective for gathering requirements. It is a more structured approach of requirements gathering than brainstorming.

8] survey / questionnaire :- When collecting information from many people, too many to interview with budget and time constraints. a survey or questionnaire can be used.

2. List verification and validation techniques for requirements.

ANS)

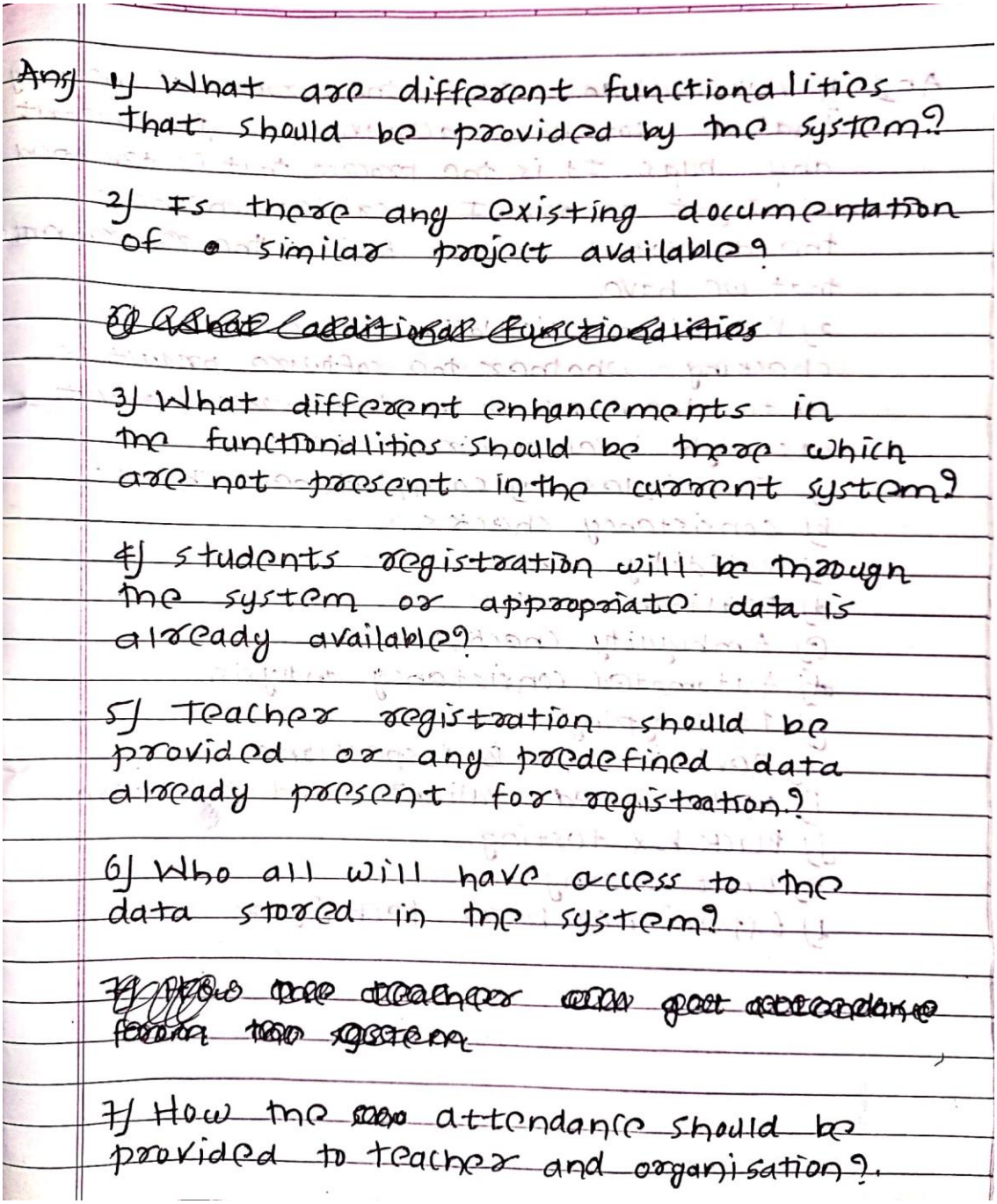
Ans 1) Verification :- It is the process of checking that a software achieves its goal without any bugs. It is the process that is developed is right or not. It verifies whether the developed product fulfills the requirements that we have.

2) Validation :- Validation is the process of checking whether the software product is up to the mark or in other words product has high level requirements.

3) Techniques :- a) completeness checks.
b) consistency checks.
c) validity checks.
d) Realism checks.
e) Ambiguity checks.
f) Automated consistency analysis.
g) Prototyping.
h) Reviews and inspections.
i) Model-based validation and verification.
j) Black box testing.
k) Unit testing.
l) Experience based techniques.

3. Prepare questionnaire for the allotted project considering your lab instructor is the client for requirement gathering.

ANS)


Ans 1) What are different functionalities that should be provided by the system?

2) Is there any existing documentation of a similar project available?

~~3) What additional functionalities~~

3) What different enhancements in the functionalities should be there which are not present in the current system?

4) Students registration will be through the system or appropriate data is already available?

5) Teacher registration should be provided or any predefined data already present for registration?

6) Who all will have access to the data stored in the system?

~~7) How the teachers can get attendance from the system~~

7) How the attendance should be provided to teacher and organisation?

8) Does teacher will be provided with personal lecture attendance?

9) What must be the form of attendance sheet generated.

10) What will be the procedure to change ~~address~~ in admin?