Project Report on

Automated Pedagogy Platform for Performance Evaluation

Submitted in partial fulfilment of the requirements

of the degree of Bachelor in Engineering

By

Name of student	Class	Roll No.
Anish Punamiya	BE4	29
Aakash Jain	BE3	25
Parth Shah	BE4	42

Under the guidance of

Prof. Shahzia Sayyad

(Guide)

DEPARTMENT OF COMPUTER ENGINEERING

SHAH AND ANCHOR KUTCHHI ENGINEERING COLLEGE

CHEMBUR, MUMBAI – 400088.

2020 – 2021

www.shahandanchor.com Tel: 022 2558 0854

Mahavir Education Trust's

SHAH & ANCHOR KUTCHHI ENGINEERING COLLEGE

Mahavir Education Trust Chowk, W.T. Patil Marg, Chembur, Mumbai 400 088

Affiliated to University of Mumbai, Approved by D.T.E. & A.I.C.T.E.

UG Programs Computer Engineering & Information Technology accredited by NBA for 3 years w.e.f. 1st July 2019

ISO 9001:2008 Certified

Certificate

This is to certify that the report of the project entitled

Automated Pedagogy Platform for Performance Evaluation

Is a bonafide work of

Name of student	Class	Roll No.
Anish Punamiya	BE4	29
Aakash Jain	BE3	25
Parth Shah	BE4	42

Submitted to the

UNIVERSITY OF MUMBAI

During semester VIII in partial fulfilment of the requirement for the award of the degree of

BACHELOR OF ENGINEERING

in

COMPUTER ENGINEERING.

(Shahzia Sayyad)
Guide

(Prof. Uday Bhave)
I/c Head of Department

(Dr. Bhavesh Patel)
Principal

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Attendance Certificate

7th May, 2021

To,

The Principal

Shah and Anchor Kutchhi Engineering College,

Chembur, Mumbai-88

Subject: Confirmation of Attendance

Respected Sir,

This is to certify that Final year (BE) students

Anish Punamiya, Aakash Jain, Parth Shah

have duly attended the sessions on the day allotted to them during the period from January 2021 to May 2021 for performing the Project titled Automated Pedagogy Platform for Performance Evaluation.

They were punctual and regular in their attendance. Following is the detailed record of the student's attendance.

Attendance Record:

Date	Anish Punamiya	Aakash Jain	Parth Shah
21/01/2021	**Present**	**Present**	**Present**
25/01/2021	**Present**	**Present**	**Present**
30/01/2021	**Present**	**Present**	**Present**
09/02/2021	**Present**	**Present**	**Present**
18/02/2021	**Present**	**Present**	**Present**
24/02/2021	**Present**	**Present**	**Present**
28/02/2021	**Present**	**Present**	**Present**
03/03/2021	**Present**	**Present**	**Present**
11/03/2021	**Present**	**Present**	**Present**
23/03/2021	**Present**	**Present**	**Present**
08/04/2021	**Present**	**Present**	**Present**
15/04/2021	**Present**	**Present**	**Present**
27/04/2021	**Present**	**Present**	**Present**
03/05/2021	**Present**	**Present**	**Present**
26/05/2021	**Present**	**Present**	**Present**

Prof. Shahzia Sayyad

Internal Guide

Approval for Project Report for B. E. Semester VIII

This project report entitled Automated Pedagogy Platform for Performance Evaluation by Anish Punamiya, Aakash Jain andParth Shah is approved for semester VIII in partial fulfilment of the requirement for the award of the degree of Bachelor of Engineering.

Examiners

1._____

2._____

Guide

1._____

Date: 7th May, 2021

Place: Mumbai

Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Name of student	Class	Roll No.	Signature
Anish Punamiya	BE4	29	
Aakash Jain	BE3	25	
Parth Shah	BE4	42	

Date: 7th May, 2021

Place: Mumbai

Abstract

Game-based learning is an approach to learning where gaming concepts are implanted in learning tasks designed by teachers. Here, learning activities boost a student's commitment and inspiration to learn. Components of game-based learning include quizzes, point system, leader board, and classroom response systems. Game-based learning is additionally a functioning learning method where games are utilized to improve student's learning. With the ongoing COVID-19 pandemic, various changes have been seen in the field of education. Physical classrooms have been converted into online lectures. Paper based tests have been replaced with online quizzes and assessments. In such a situation, Game-Based Learning has proven to be a pragmatic option for improving a student's assessment where paper-based evaluation is not possible. Various Game-Based Learning Systems have been built previously, however none of them gives a complete set of all the features without being exorbitantly expensive. So, we aspire to assemble a plausible and secure teaching project where all aspects would be accommodated in a single and straightforward application required for the complete assessment of every student. This system cuts down the workload of teachers by creating a test by scanning the questions with the help of Optical Character Recognition (OCR) and Speech-To-Text Recognition technique so that the teacher need not type the question and thus reducing the test creation time and efforts. It also reduces the teacher's workload by assessing the students based on their scores.

Acknowledgement

We are thankful to our college Shah and Anchor Kutchhi Engineering College for considering our project and extending help at all Stages needed during our work of collecting information regarding the project.

We are deeply indebted to our Principal **Dr. Bhavesh Patel** and Head of the Computer Engineering Department. **Mr. Uday Bhave** giving us this valuable opportunity to do this project.We express our hearty thanks to them for their assistance without which it would have been difficult in finishing this project synopsis and project review successfully

We take this opportunity to express our profound gratitude and deep regards to our guide**Prof. Shahzia Sayyad** for her exemplary guidance, monitoring and constant encouragement throughout the course of this project. The blessing, help and guidance given by her time to time has carried us a long way in the journey which we embarked. She rendered her valuable guidance with a touch of inspiration and motivation. She guided us through quite a lot substantial hurdle by giving plenty of early ideas, which finally resulted in present fine work. We would also like to thank her for helping us with our technical paper publications and its copyright procedure.

Lastly, we thank the teaching and non-teaching staff of our college as well as the library staff for providing us timely essential information in the form of books for their invaluable guidance and help in laboratory.

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Chapter 1

Introduction

Game-based learning can be defined as the borrowing of a few gaming principles and using them to real-life settings to engage students. The motivational psychology associated with game-based learning allows students to engage with educational materials in an energetic and dynamic way. It can be difficult to keep students involved and inspired to understand complicated concepts; this is especially true if the challenge seems daunting and new to students and in times of pandemic in which multiple improvements have been made in the field of education this task is even more challenging.

As of March 2021, approximately more thanhalf of the world's students are currently affected because of school closures in response to the COVID pandemic. It is practically impossible for students to attend the college physically or to even appear for a pen-paper based test. This arises the need of a system where the learning process takes place through different and attractive scenarios for overcoming various challenges and where the learning experience is positive and interesting.

In such a technology-oriented environment where everything is happening online, Game-based student response systems (GSRS) are becoming prevalent. There are several existing GSRS but none of them can be considered as completely feasible. Most systems are either very expensive for any Institute to incorporate or do not have all the features which are needed. A feasible Game-Based Learning System is required where the instructor plays the role of a game host and the students are the players. The games will be beneficial for academic achievement of students by monitoring a healthy competition amongst them, motivating them to perform better than others and improving classroom dynamics by constant engagement in the class.

The system will help to improve the performance of the student by providing an adaptive learning platform. It allows the teacher to know the shortcomings of his/her students and where the teacher needs to work upon in order to fulfil the role of an intellect developer. We endeavor to combine different techniques like OCR and Speech-to-Text Recognition for better results.

1.1 Motivation

The main inspiration for this project is our honorable Prime Minister Shri. Narendra Modiji's vision of Atma-Nirbhar Bharat, making India a self-reliant nation. With that vision in mind, the system's ultimate aim would be assessment of every student based on adaptive learning by making an unbiased judgement on the overall performance of the student. Our motivation was doubled with every new COVID 19 wave in our country which made us realize the necessity for this system. With the ongoing advancements and the pandemic scenario, a tipping point may just be a couple of years away where adaptive learning becomes a standard and expected offering rather than the relative reality.

Chapter 2

Literature Survey

2.1 Survey of Existing System

With the advancements in Technology being used in Education, there are several existing quiz systems present which are extensively used worldwide. Out of those systems, we have studied 11 existing systems-

- Kahoot
- Quizziz
- Google Form
- Socrative
- Classtime
- Gimkit
- Bookwidget
- Quizlet
- Formative
- Mentimeter
- Polleverywhere

The features of these systems are compared according to 3 modules which are:

- Student
- Teacher
- Result

Table-2.1: Student module Comparison table

	Kahoot!	Quizziz	Google Form	Socrative	Classtime	GimKit	Book widget	Quizlet	Formative	Menti meter	Poll Everyw here
Login to new game	Game Pin	Game Code	Gmail account	Room Name	Student code	Game code	QR code, CR	Join code	Join code	Code	User-name
Separate student profile	✓	✕	✕	✕	✕	✕	✕	✕	✓	✕	✕
Number of students	2000	500	No limit	150	40-free 300-paid	500	-	-	-	-	-
Time Based	✓	✓	✕	✓	✓	✓	✓	✓	✓	✓	✓
Student answer speed based	✓	✓	✕	✕	✕	✕	✓	✓	✕	-	-
Challenge friends	✕	✓	✕	✕	✕	✕	✕	✕	✕	✕	✕
Quiz recommendations	✓	✓	✕	✕	✕	✕	✓	✕	✓	-	-
Class rank display	✓	✓	✕	✕	✓	✓	✓	✓	✓	-	-
Feedback	✓	✕	✕	✕	✕	✕	✓	✕	✓	✓	-
Mobile support	✓	✓	✓	✓	✕	✕	✓	✓	✕	✓	✓

Table-2.2: Teacher Module Comparison Table

	Kahoot!	Quizziz	Google Form	Socrative	Classtime	GimKit	Book widget	Quizlet	Formative	Menti-meter	Poll Everywhere
Add rich text formatting	✓	✓	✓	✓	✕	✕	✕	✓	✓	✕	✓
Import quiz from excel sheet	✓	✓	✕	✓	✕	✓	✓	✓	✕	✓	✓
Add math equation/ Symbols	✓	✓	✕	✓	✕	✓	✕	✕	✓	✕	✕
Quiz preview	✓	✓	✓	✕	✓	✕	✓	✕	✓	✓	✕
Quiz arranged in folders	✕	✓	✓	✓	✕	✕	✓	✓	✓	✓	✓
Rationale	✕	✕	✕	✓	✓	✕	✓	✕	✕	✕	✕
Byte limit for question	120	No Limit	No limit	No limit	170	220	No limit	No limit	No Limit	150	256

Live Quiz	✓	✓	✕	✓	✓	✓	✓	✕	✓	✓	✕
Self-Learn	✓	✓	✓	✕	✕	✓	✕	✓	✓	✕	✓
Add Image/ Audio/Video	✓	✓	No audio	Only image	No audio	✓	✓	✕	✓	Only image	Only image
Launching the Quiz	Via code	Via code	Via link	Via code	Via code	Via code	Via code	Via Link	Via code	Via code	Via Link
Randomize options/ questions	✓	✓	✓	✕	✕	✕	✓	✕	✓	✕	✕

Table-2.3: Result Module Comparison Table

	Kahoot!	**Quizizz**	**Google Form**	**Socrative**	**Classtime**	**GimKit**	**Book widget**	**Quizlet**	**Formative**	**Menti meter**	**Poll Everywhere**
Key Stats	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Time Record	✓	✓	✓	✕	✕	✕	✕	✕	✕	✕	✕
Avg. Question Time Taken	✓	✓	✕	✕	✕	✕	✕	✕	✕	✕	✕
Avg. Quiz Time	✓	✓	✕	✕	✕	✕	✕	✕	✕	✕	✕
Question View	✓	✓	✓	✓	✕	✕	✕	✕	✕	✕	✓
Student View	✓	✓	✓	✓	✕	✕	✕	✕	✕	✕	✓
Overall Report	✓	✓	✕	✓	✓	✕	✓	✓	✓	✓	✓
Top Scorers	✓	✓	✕	✕	✕	✕	✕	✕	✕	✕	✕
Least Scorers	✓	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
Re-Quiz	✓	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
Difficult Questions	✓	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
Chart View	✓	✓	✕	✓	✓	✕	✓	✓	✓	✓	✓
Rename &Arrange Report	✓	✕	✕	✓	✓	✕	✓	✓	✓	✓	✓
Download	✓	✓	✓	✓	✓	✕	✓	✓	✓	✓	✓

Table-2.4: Cost Analysis of Existing Systems

System	Price
Kahoot!	Plus-$120 per year Pro-$199 per year
Quizizz	FREE
Google Form	FREE
Socrative	Basic-Free Pro-$60 per year
Class Time	$60 per year
Gimkit	$60 per year
Bookwidget	Students-Free Teachers-$49
Quizlet	$20 per year
Formative	Premium-$12 per month
Mentimeter	Basic-$10 per month Pro-$25 per month
Polleverywhere	Basic-$42 per month Small Team-$84 per month Enterprise-$9,999+

2.2Limitation of Existing Systems

1. In Socrative the answers can only be true or false, Short answer or multiple choice. This can be a limitation because there are other options like a long paragraph, multiple selections, numeric entry helps to enhance the experience of testing better for students.
2. In apps like Kahoot and Quizizz, since students receive more points for quicker answers, it can emphasize speed over substance. The fact that “Kahoot!” gives extra credit has an emphasis on reaction time rather than pure knowledge is unfair, because some people might know the material in the games just as well, but not have the reaction time to win extra points for their better grades.
3. Kahoot requires a common interface to play, and this is only possible in classrooms, and if there is a video lecture going on which is the case in today's time due to COVID-19, but the students would require two devices which is a privilege not all students have hence a common interface would be difficult.
4. Questions and options have limit up to 120 characters in Kahoot! This can prevent teachers to enter long questions or long options if they want to.

5. Systems like Polleverywhere, Socrative, Gimkit and Classtime and Kahoot which has many of features is not suitable perfectly for all the Institutes to use, because it is expensive and the free version has limited features.
6. Though Quizziz and Google Forms are free and has many features that other systems have. However, Cheating is possible in systems like Quizziz because with the help of web extensions like Easy Script Hub students can get answers to the questions and in Google Forms the students can share each other the answers to the question therefore cheating is possible in both the systems which won't allow a just evaluation of students.
7. Students can appear for a quiz with false names in many systems and the teacher won't know if the user is genuine or he is just trying to cheat by entering a false name.
8. The design customization for the quiz is very limited in Google Forms. If the users could change the font and style of the text than it could be more interactive for students
9. The teacher does not get a tabular report of each student in systems like Gimkit.

Chapter 3

Software Requirement Specification (SRS)

3.1 Introduction

Purpose

- Responses by the candidates will be checked automatically and instantly.
- Online examination will reduce the hectic job of assessing the answers given by the candidates.
- Being an integrated Online Examination System, it will reduce paper work.
- Can generate various reports almost instantly when and where required.

Intended Audience and Reading Suggestions

The document is intended for developers, project managers and users like faculty members and students.

Product Scope

This project would be very useful for educational institutes where regular evaluation of students' is required. Further it can also be useful for anyone who requires feedback based on objective type responses.

3.2 Overall Description

Product Perspective

Required software is for conducting online examination and providing immediate results

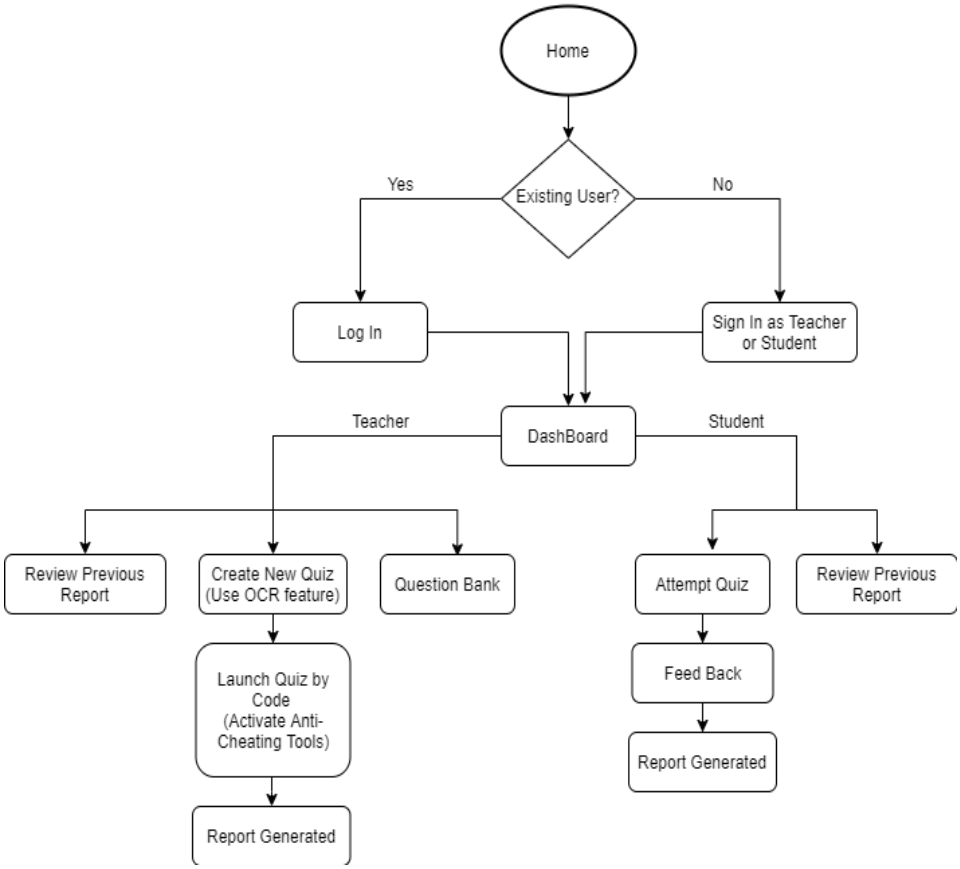

Figure 3.1: System Flowchart

Product Functions

- Evaluate progress of every student based on a game-based learning system.
- Easy creation of quizzes where questions can be selected from a pool of questions.
- Providing a secure online platform for conducting exams.
- Create the system in such a way that there is no chance of cheating

User Classes and Characteristics

Table-3.1:Acronyms and description

Sr. No.	Terms/Acronyms	Description
1.	Student	User mostly a student who will appear for the examination
2.	Faculty	Another user mostly faculty member, lecturer or examiner who posts set of questions, the available options and correct answers.
3.	Admin	Another user mostly head of department, adds faculty and subjects.
4.	Super Admin	Super user, adds admin and manages the entire system.

Operating Environment

Software

Netbeans or Eclipse for PHP and XML coding.

Apache Tomcat as Web server

Hardware

Server

The minimum hardware as recommended by all of the software required on server side say web server, operating system and development software

- Processing speed of 1.6 GHz
- 1 GB of RAM
- Network interface

Client

The minimum hardware as recommended by all of the software required on client side say web browser, operating system

- Minimum hardware depending on the operating system use

Design and Implementation Constraints

Availability Constraints:

Though the system should be available 24x7 some features may be restricted.

- Quiz creator may allow the specific test to be available only at certain time like scheduled examination.
- The test may be time limited so the candidates appearing will have limited time to answer the test.

Portability Constraints:

- Portability would be limited to the support provided by the respective application vendor on various architectures and operating environments

Assumptions and Dependencies

1. Username are valid email addresses of respective user.
2. Super Administrator has the authority to add/delete administrator level accounts.
3. Super Administrator can manage the entire system.
4. Administrator has the authority to add/delete faculty level accounts.
5. Faculty members have the authority to approve/expel student.
6. Faculty members have the authority to change student's class.

4.3 External Interface Requirements

User Interfaces

The authorized user can input data with the help of external keyboard. The software provides side menu to navigate to various windows. The included windows are:

1. Dashboard
2. Profile
3. Subjects
4. Students
5. Examinations
6. Exam Results
7. Notifications

Hardware Interfaces

Server-side hardware

- Hardware recommended by all the software needed.
- Communication hardware to serve client requests

Client-side hardware

- Hardware recommended by respective client's operating system and web browser.
- Communication hardware to communicate the server.

Software Interfaces

Server-side software

- Web server software, Apache Tomcat
- Server side scripting tools: PHP
- Database tools: Sedna native XML DBMS.
- Compatible operating system: Linux, Windows

Client-side software

- Web browser supporting JavaScript, refer Browser Compatibility 2.3.1

Communications Interfaces

Following protocols are required to be permitted on the server side

- HTTP incoming request
- HTTPS incoming request if secure gateway is implemented

Following protocols are required to be permitted on the client side

- HTTP outgoing request
- HTTPS outgoing request if secure gateway is implemented

4.4 System Features

Super Administrator can perform the following tasks:

1. Register - To able to login into the system, the user first needs to register.
2. Login: Then Registered User Can be allowed to view inner details of the system by logging in.
3. Change password and forgot password: User has rights to modify his login details and also be able to retrieve the forgotten password via mail.
5. Entering/modifying admin details: Addition of new admin and deletion or modification of old admins can be done by this user.
6. Entering/modifying department details: Addition of new department and deletion or modification of old department can be done by this user.
7. Notifications: User can send notifications to all other users.

Administrator can perform the following tasks:

1. Register - To able to login into the system, the user first needs to register.
2. Login: Then Registered User Can be allowed to view inner details of the system by logging in.
3. Change password and forgot password: User has rights to modify his login details and also be able to retrieve the forgotten password via mail.
4. Modifying other User Details: Admin can change the status of each user that is teacher and the student.

6. Entering/modifying User details: Addition of new user and deletion or Modification of old user can be done by this user.
7. Notifications: User can send notifications to all other users.

Teacher can perform the following tasks:

1. Register - To able to login into the system, the user first needs to register.
2. Login: Then registered user can be allowed to view inner details of the system by logging in.
3. Change password and forgot password: User has rights to modify his login details and also be able to retrieve the forgotten password via mail.
4. Modifying other User Details: Teacher can change the status of each student.
5. Creating a test
6. Posting questions in the above test
7. Posting multiple options to respective question
8. Marking correct answer within the given options
9. Time limit of the test if any.
10. To allow the test to be taken in practice mode where the correct answer is shown immediately after the candidate selects an option.
11. Update questions: if any corrections in data of questions teacher can modify them.
12. Update exams: Teacher has rights to modify exam schedule.

Students can perform the following tasks:

1. Register - To able to login into the system the user first needs to register.
2. Login: Then registered user can be allowed to view inner details of the system by logging in.
3. Change password and forgot password: User has rights to modify his login details and also be able to retrieve the forgotten password via mail.
4. Edit user information.
5. Selecting the test.
6. Selecting whether the test to be taken in practice mode where the correct answer is shown immediately after the candidate selects an option.
7. Appearing for the examination.
8. Reviewing the given responses.

4.5 Nonfunctional Requirements

Performance Requirements

The system would be used by multiple users at a time and may grow as time passes; the system would need to implement multithreading to achieve acceptable performance. Further a database connection pool may also be required for assigning faster database connection.

Safety Requirements

- System should be able handle multiple users.
- Database updating should follow transaction processing to avoid data inconsistency.

Security Requirements

- Super Administrator has the highest authority to edit/delete/create database
- Administrator have the authority to add/expel students
- Students can only view their test records.
- Faculty can view all the test records of every student.
- OTP verification for login is must for every user.
- Critical information like passwords should be transferred in encrypted form
- Passwords should be stored in encrypted form

Software Quality Attributes

1. **Reliability**

Data validation and verification needs to be done at every stage of activity.

- Validating user using OTP
- Validating user input
- Use of locking mechanism while updating database like transaction processing
- Recovering the transaction using rollback.

2. **Availability**

The examination system being an online system should be available anytime.

3. Portability

- The web application will be built using PHP which has support to run on any platform provided the required compilers are available.
- For database either XML or MySQL would be used, that too has extensive support over many popular architectures and operating systems.

Chapter 4
Project Scheduling and Planning

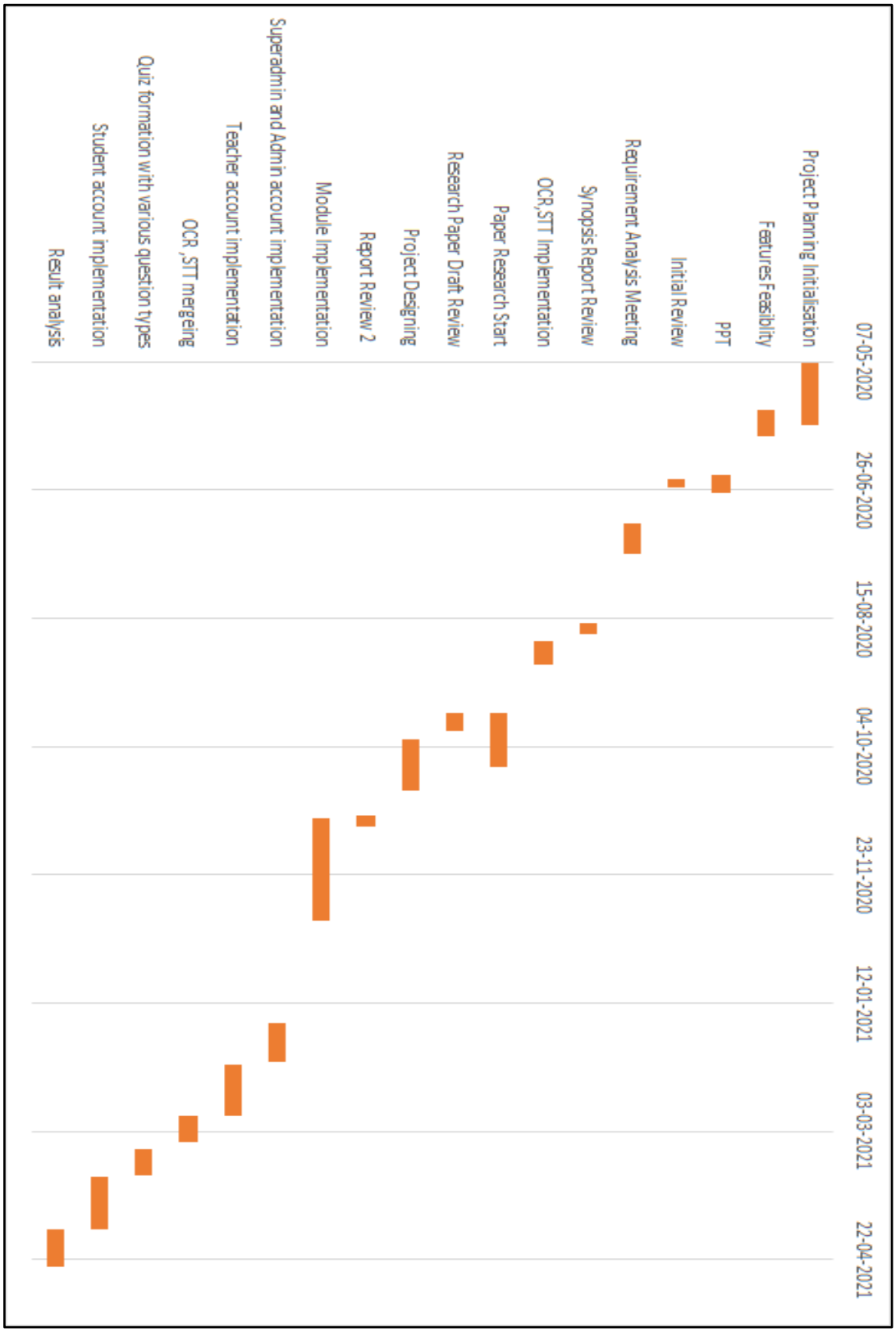

Figure4.1: Project Scheduling and Planning

Chapter 5
Proposed System

5.1 Problem Statement and Objective

Problem Statement

Evaluation of the progress of a student is a key aspect of teaching. So, to build a web-based application which will allow the teacher to take a quick test of a student after the lecture to know the progress of the student. The app should allow teacher create a quiz very easily and she should be able to pick questions from the question pool for each subject.The web application should be easy to use and avoid complexities and wasting of time. The application should provide a comprehensive result for easy evaluation. Further the result would also be mailed to the student. To implement in such a way that students will have very little chance of cheating while giving the test by using tools like camera supervision and anti-cheating tools.

Objective

1. Evaluate progress of every student based on a game-based learning system.
2. Easy creation of quizzes where questions can be selected from a pool of questions.
3. Adaptive and non-adaptive testing based on various parameters like time limit, question limit etc.
4. Giving Institutes and Companies a tool where mass test can be organized for assessments.
5. Providing a secure online platform for conducting exams.
6. To make learning a fun experience for students.

5.2 Scope

The system will deal with Multiple Choice Questions (Single/Multiple), Fill in the blanks and True/False questions and these questions will contain textual elements, formulas, diagrams, equations etc. The scope of the project is not only limited to assessing students at school and colleges but also for any environment which requires testing for enhancement, be it companies or institutions that require to assess the performance of their employees or managers. The goal of the system is to personalize instruction in order to improve or accelerate an individual performance.

5.3 Framework

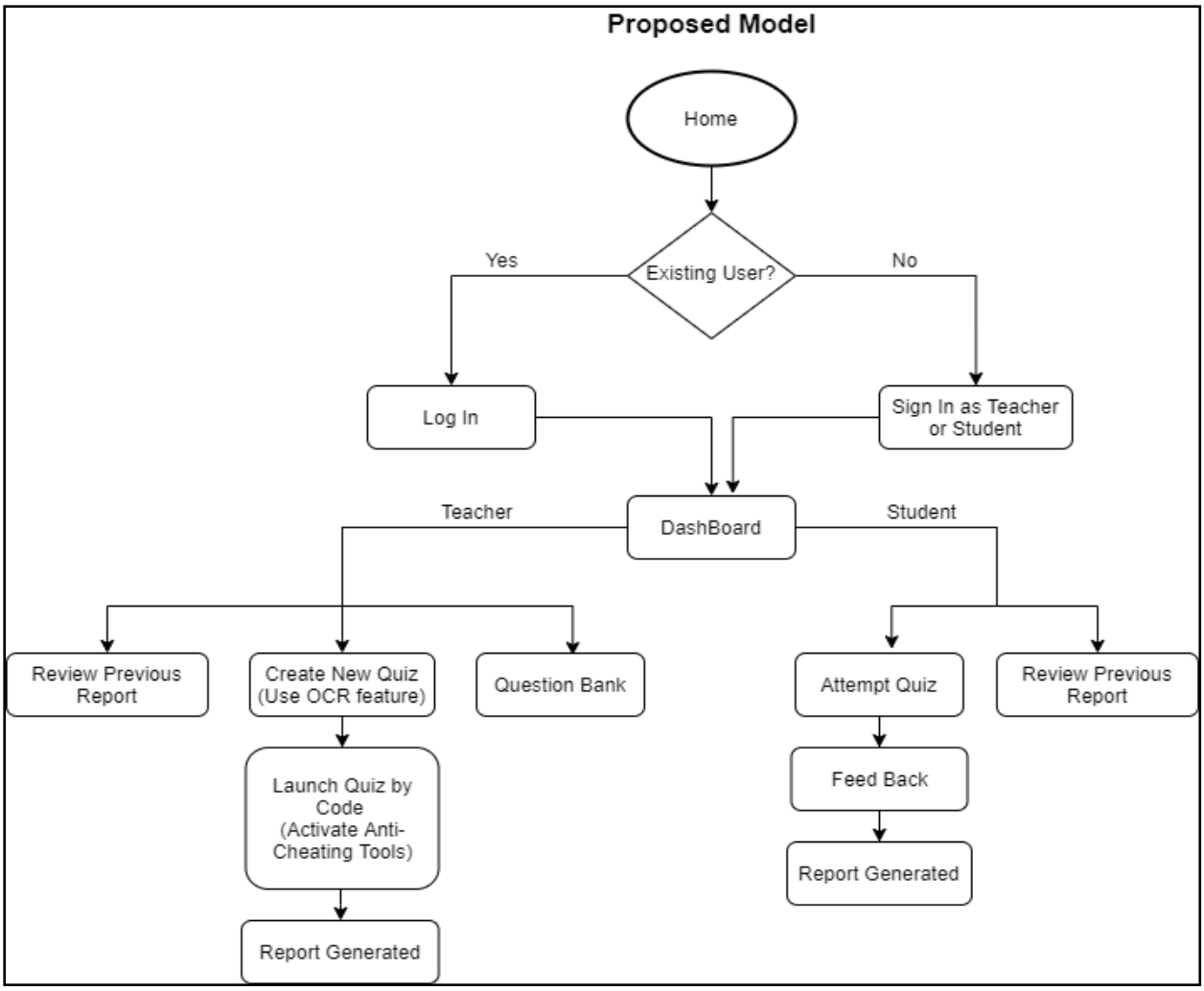

Figure 5.1. Flowchart of the Proposed Model

The proposed system has two type of user accounts-Teacher and Student Account. These two accounts will differ from each other in their features. After validating the account, the Teacher will be guided to the Dashboard which has different features like checking Previous Reports, Download Reports, Question Bank where they can view and add questions and create Quiz. The system will allow the teacher to add different types of questions in the quiz namely Fill in The Blanks, Multiple Choice Questions, Multiple Answers, Long Answers, etc. along with time constraints. After creating the quiz, the quiz can be launched by the teacher by sharing the code or link with the students. Once the student enters the code or clicks the link, he/she will be validated by the organizer. After the quiz, a detailed tabular report will be generated for entire group of participants as well as individual participants, showing several key points

like accuracy, average time taken to answer, leader board, etc. If the account is of a Student, Dashboard will show him Reports of previously attempted Quizzes and to attempt a quiz by entering code or link. After the quiz is finished, the student will see a detailed report of his responses.

Key Features

1. Optical Character Recognition (OCR): This will help teachers in saving time as this model will identify characters of printed sentences and directly use them as questions.
2. Speech-To-Text Recognition (STR): This provides the additional functionality to read aloud, take Questions verbally and also take Answers Verbally. The model will recognise the speech in recorded answers and send to the test organiser as Text if required.
3. Feedback after Quiz.
4. Student can post queries to the teacher in comment section.
5. Anti-cheating tools: This feature will provide authenticity of assessments and provide a secure environment for conducting them.
6. Secure Testing Environment: Students can use a built-in camera in the computer or a separate webcam and the camera can show a 180-degree or 360-degree view of the room, as required by the test organizers. The students will be monitored via camera by the test organizers for any malpractices.
7. Prevent Copy and Paste option during Assessments.
8. Terminate the assessment if multiple tabs or other applications detected on the test taker's system.

Objectives

The main objectives of the proposed system are:

1. Evaluate progress of every student based on a game-based learning system.
2. Easy creation of quizzes where questions can be selected from a pool of questions.
3. Adaptive and non-adaptive testing based on various parameters like time limit, question limit etc.
4. Giving Institutes and Companies a tool where mass test can be organised for assessments.
5. Providing a secure online platform for conducting exams.
6. To make learning a fun experience for students.

5.4 Details of Hardware and Software

Hardware Requirements:

- Processors: Any above 1.9GHz.
- Ram: 2GB (or more).
- Input Devices: Keyboard and Mouse.

Software Requirements

- Operation System Windows, Ubuntu: Our web application will run on both these operating system as they are the most widely used and available.
- Platform. Web Browsers: Any standard web browsers such as Google Chrome, Internet Explorer, Mozilla Firefox etc.
- Database MySQL: As it the easy to use and compatible with both Windows and Ubuntu
- PHP scripting for server-side scripting as it has a very strong support for XML and MySQL.
- Apache as web server has a tight integration with PHP and is also available for various popular platforms.

5.5 Design Details and Methodology

5.5.1 Optical Character Recognition (OCR)

The OCR model automatically identifies characters through an optical mechanism. It is fit for perceiving printed text. The performance can be judged based on the quality of the documents to be scanned and the camera being used to capture the image. This innovation empowers devices to analyse, interpret scanned images and convert them to genuine electronic text. OCR feature will help test organizers to use text from articles, books directly rather typing them again. Many times, the questions or content is printed in books and to use it we need to type it which takes a lot of time. This will help organizers save time. OCR works in Browser by combining Python, OpenCV and OCR. space API. We need to send through their API a picture with the content we need to scan and it will return us the text scanned.

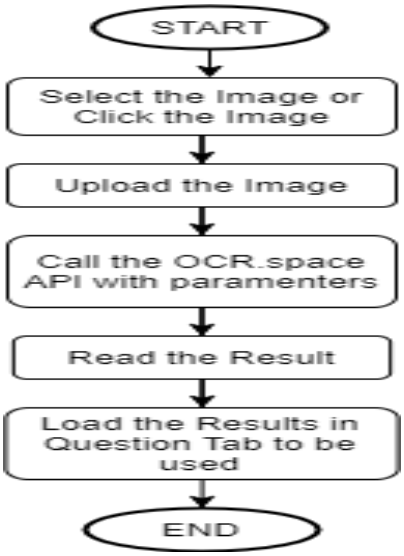

Figure 5.2. Flowchart of OCR

The OCR system allows for quick translation of image to text and does not require typing, editing data and memory utilization. OpenCV is chosen as the engine of the OCR because of its widespread approbation, extensibility, flexibility and suits well for browser-based models. To perform character recognition, the application has to go through four important steps which are as follows: -

1. Selecting or Clicking the Image: Device Camera can be used to capture the image of document or it can be selected from the device storage.
2. Uploading the Image: The image can be directly uploaded or it can be cropped to select only the specific area before uploading if required.
3. Call the API with Parameters.

There are three parameters:

a. Url_api

b. Call “Files” which contains the name of the file and the file bytes we generated before after we compressed the image.

c. Call “Data” which contains the post parameters of the OCR engine.

4. Read the Result: The result from the server is a string and the result is read using JSON.
5. Load the Result in Question Tab Directly.

Results

Input 1-

Figure 5.3: Input 1 of OCR

Output 1-

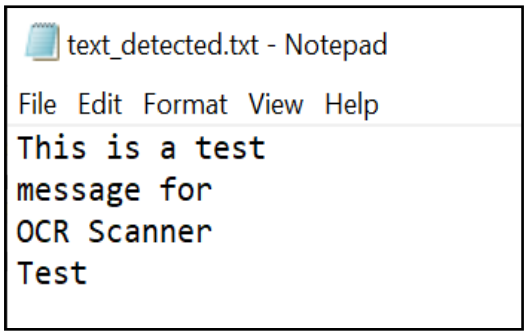

Figure 5.4: Output 1 of OCR

Input 2 –

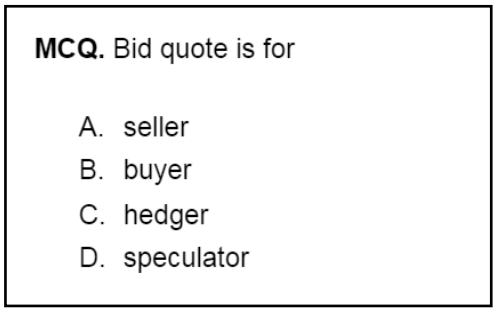

Figure 5.5: Input 2 of OCR

Output 2 -

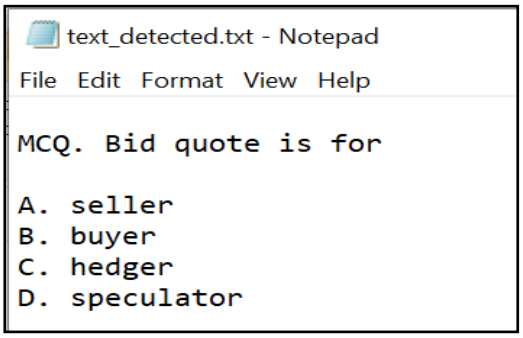

Figure5.6: Output 2 of OCR

5.5.2 Speech-To-Text Recognition (STR)

The Speech to Text model converts spoken words to electronic text. Speech must be converted from physical sound to an electrical signal with a microphone, and then to digital data with an analog-to-digital converter. This model will add oral question and answer dimensionality. This will provide different options to test organizers to test the test takers.

The Speech Recognition library is extremely flexible and supports the Google Web Speech API. This model requires audio input, Speech Recognition which makes retrieving this audio input easy and Google Voice Recognition Engine. Speech Recognition is chosen as it supports web applications.

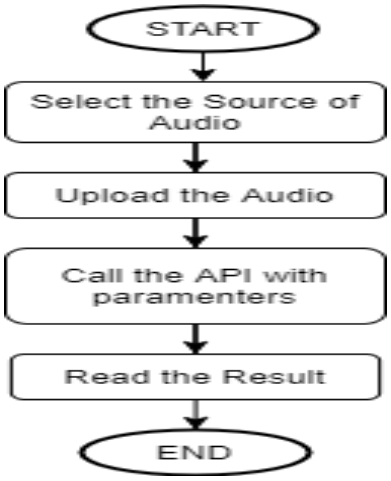

Figure 5.7 Flowchart of Speech-To-Text Recognition

To perform this recognition, the application has four important steps which are as follows:

1. Selecting the source of audio: The input to the SpeechRecognition module is of two types:
    - Pre-recorded audio file
    - Voice input through default Microphone
2. Uploading the Audio File
3. Call the API with parameters.

There are three parameters: -

a. Source of the input

b. Time for which the microphone needs to accept and record the input audio.

c. The user will need to pass the language as a parameter to the function to change the language

4. Read the Result: The result will be given in Text Form.

5.5.3Results

After everyone finishes the quiz, the score is calculated and a detailed report for every student and the entire class is generated.The leaderboard is displayed to the students and the teacher. The report displays the student's accuracy, rank, score, correct answers, incorrect answers, time taken per question and thetotal time taken for the test.Students can see the review of the quiz and analyze which questions they marked correctly/incorrectly and work on the weaker topics.

Teachers can identify questions that were the most difficult and might need re-teaching. They can identify students who need help, based on their results, or haven't completed the game. A question view can show how the entire class performed on a particular question. A student view report shows individual report of any student. The teacher will also be able to share the report via mail or download the report in a spreadsheet or chart format.

5.5.4Anti Cheating Tools

A feature of Anti-cheating tools will provide authenticity of assessments and provide a secure environment for conducting them. Students can use a built-in camera in the computer or a separate webcam and the camera can show a 180-degree or 360-degree view of the room, as required by the test organizers. The students will be monitored via camera by the test organizers for any malpractices. The copy and paste option will be disabled during assessments. The system will warn the student if any student tries to open a new tab or any other application while appearing for a test. It will also notify the organizer about the warning provided. The organizer will have the authority to terminate the test if necessary. The system will itself terminate the test in case multiple attempts of malpractices are attempted by the student.

Chapter 6
Implementation Details

6.1 Login/Signup Module:

If the user is not already registered then he can choose the option of becoming a student or teacher and can register for the same. Basic details like First name, Last name, Email ID, Username, password, and other such details are entered by the user depending upon their role are entered by the new user. Already registered users cannot register again.

Once the user is registered and has his email id registered the OTP page loads up where the user can enter the email Id and then the user will receive the OTP on their email id but the OTP is valid only for 5 minutes and can only be used once if the user fails to enter within the time constraint or the user misses the OTP, he/she will have to request for a new OTP. This feature was implemented because OTP security helps to prevent access breaches, even if an attacker has obtained a valid set of login credentials.

After the OTP module, the user is asked to enter a user name and password to log in. Once a user logs in he/she gets a Dashboard, Option to change password, and Logout option. The dashboard shows the user details and allows profile edits. Logged-in users can take up quiz tests and appear for the same depending upon their role.

If the user forgets his password, he can request the admin for a new password from the forget password section.Once the request is made the password will be sent to the user via email .

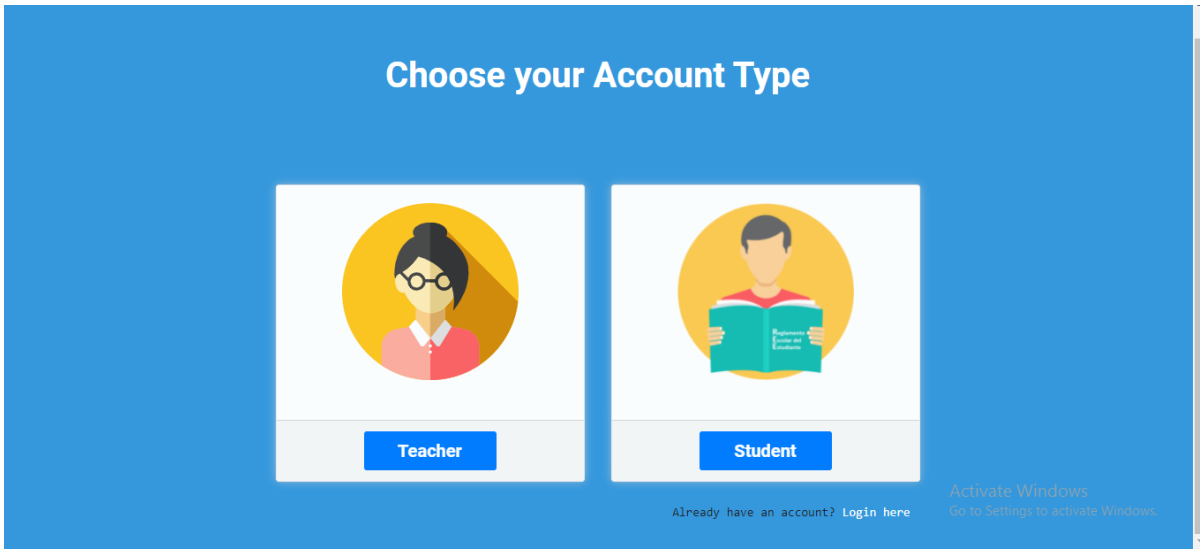

Figure 6.1.1 User Login

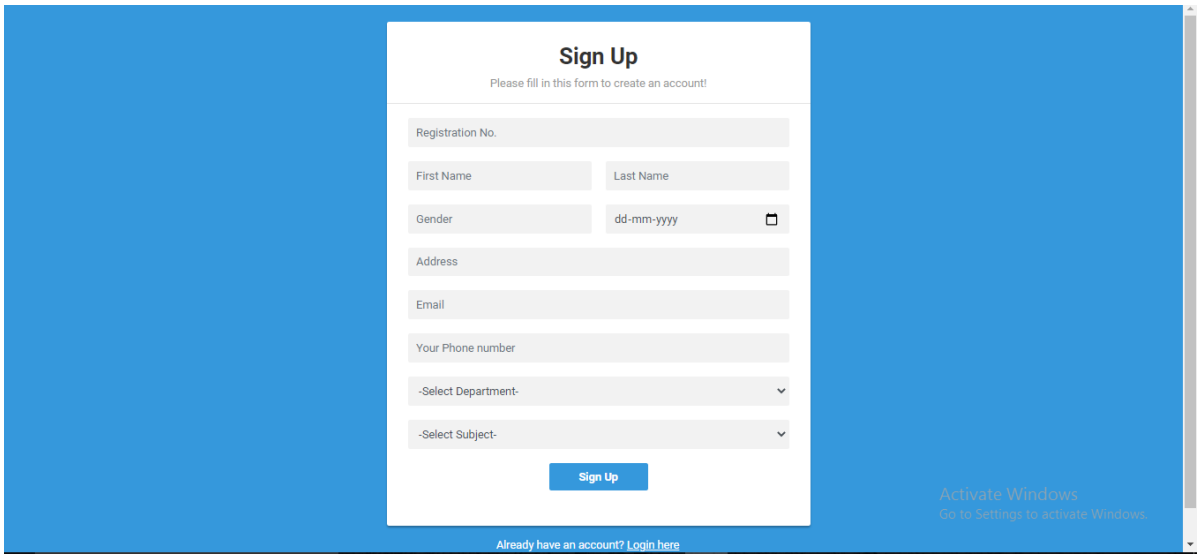

Figure 6.1.2 User Sign Up

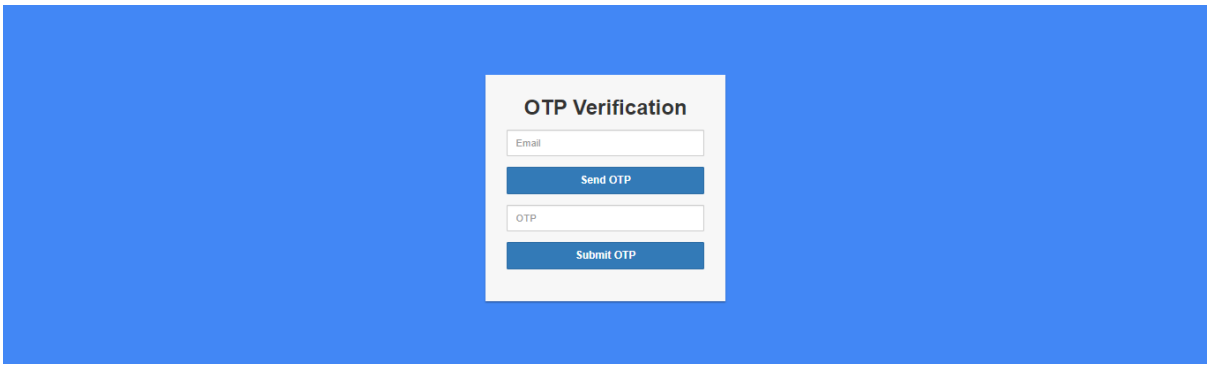

Figure 6.1.3 OTP Verification

6.2 General Features (can be used by all the users)

Once the user is logged in, he/she gets account details on my profile page. It has a dashboard showing profile details like a username, an option to change a password, and a logout option. The user can also edit his/her details if there is an error like a user can correct his/her first name /last name, date of birth, email, and gender. Also, a QR code is created for all the users which can be seen in my profile tab which can be shared with another user so that they scan it and know details of the user like name and email ID. A user can also change his profile photo if they want to.

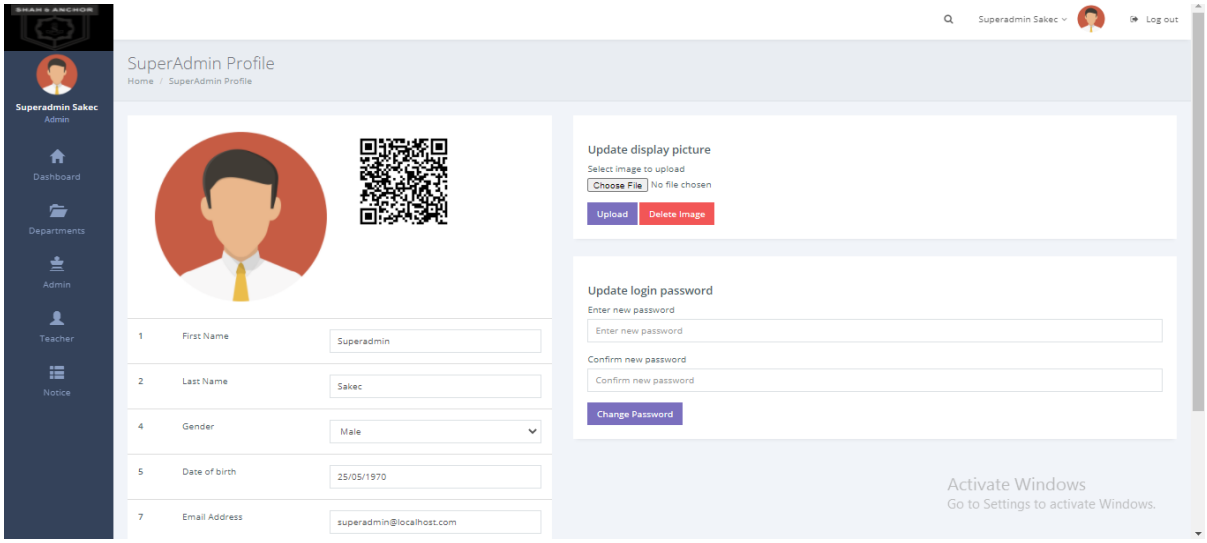

Figure 6.2.1 Admin Profile

6.3 Superadmin Module

Superadmin is at the top of the hierarchy and has lots of exclusive powers which are only available to superadmin. There is only one superadmin. The superadmin can see the number of departments, number of students registered with the systems, and number of teachers. The super admin functions include adding departments, adding admins of various departments and adding teachers. The super admin can also make any user inactive or drop him/her and also can add notice which all the students will be able to see.

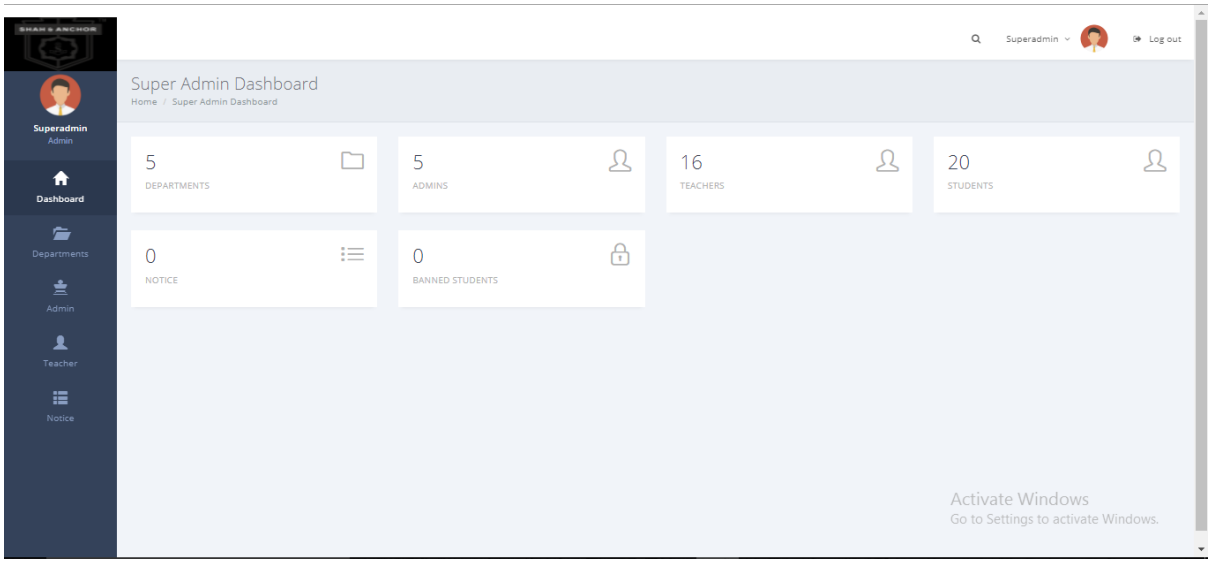

Figure 6.3.1 Superadmin Dashboard

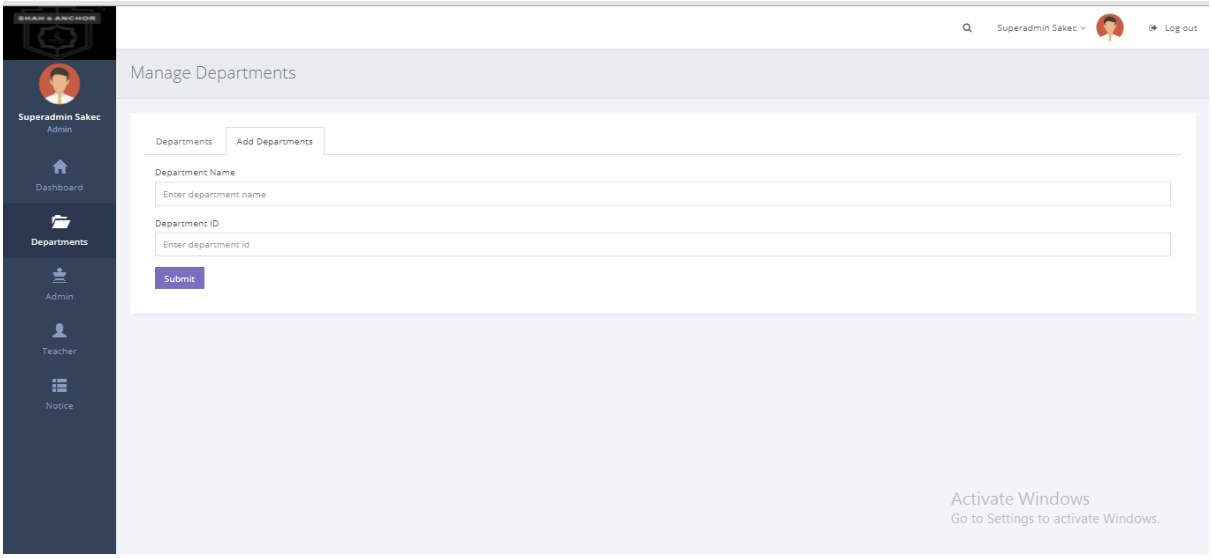

Figure 6.3.2 Superadmin Add Departments

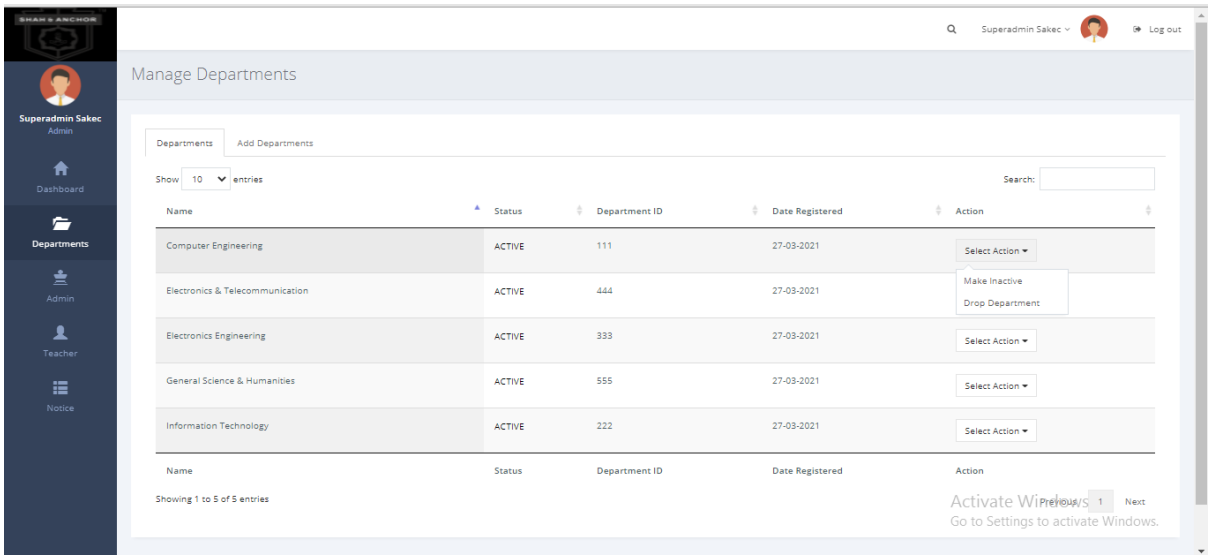

Figure 6.3.3 Superadmin Manage Departments

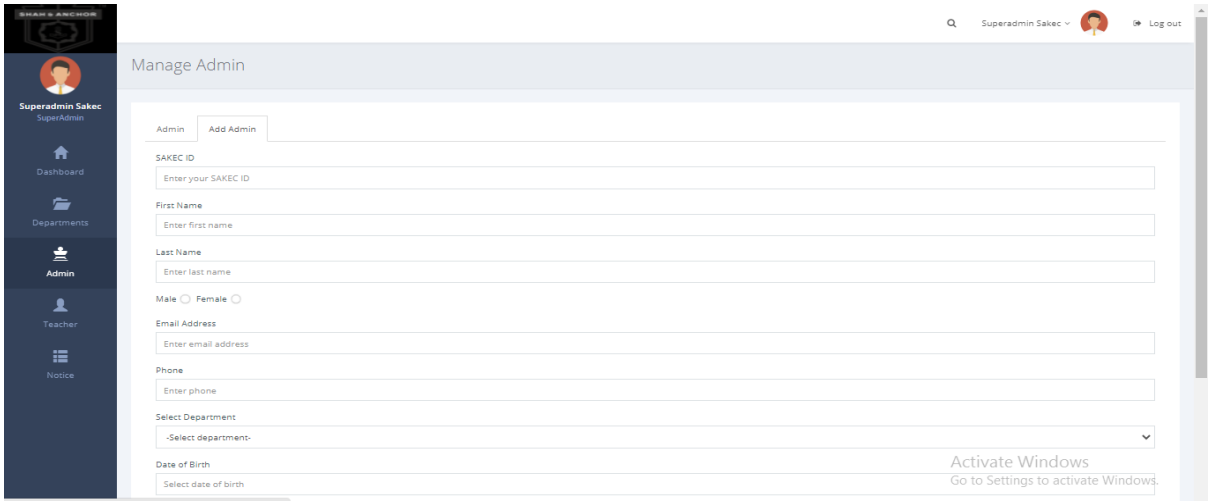

Figure 6.3.4 Superadmin Manage Admin

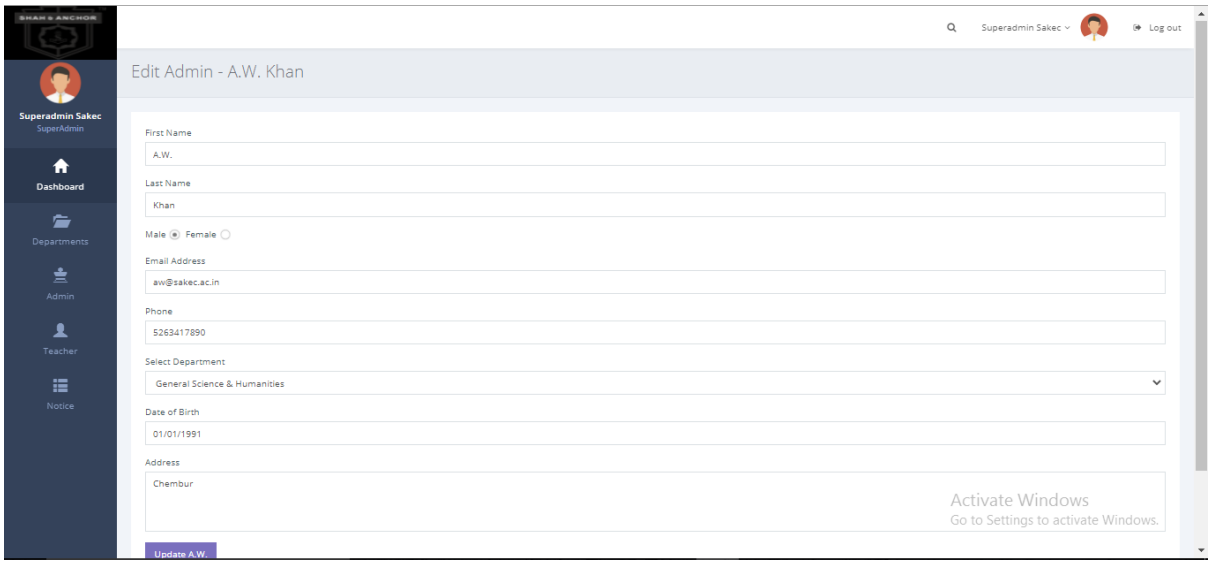

Figure 6.3.5 Superadmin Edit Admin

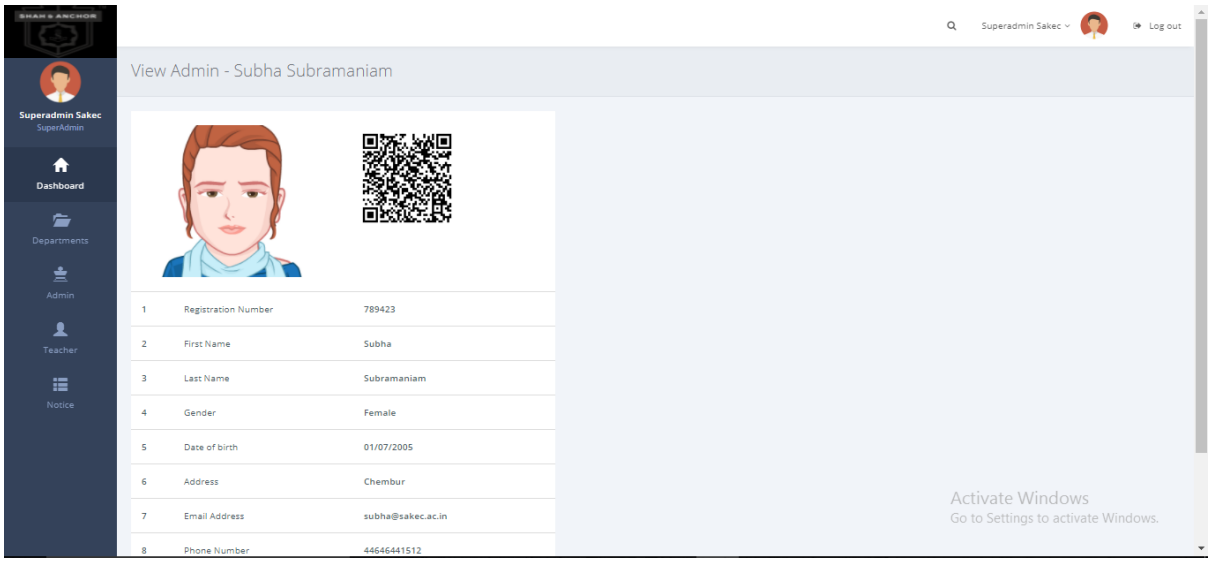

Figure 6.3.6 Superadmin View Admin

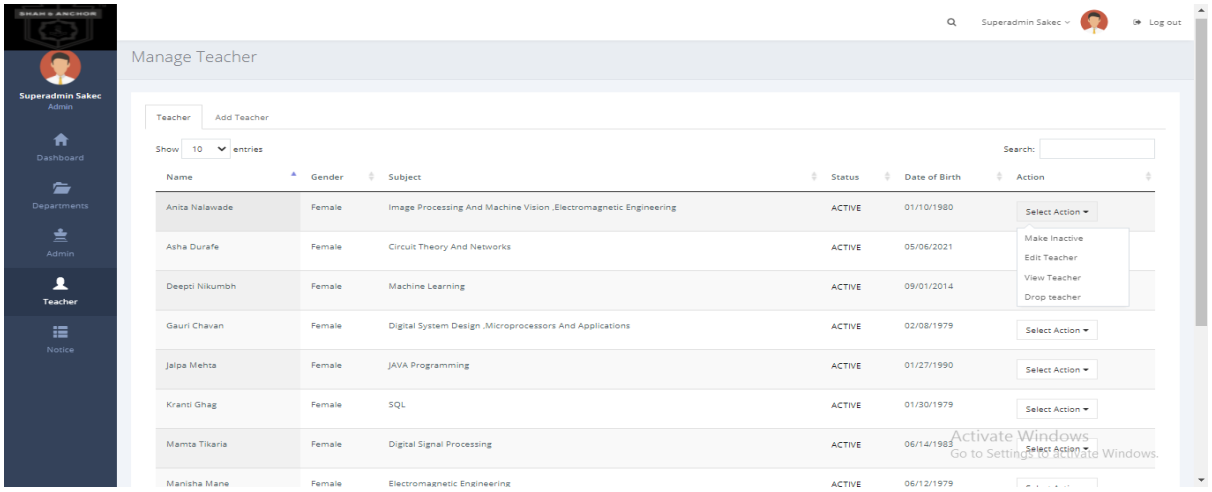

Figure 6.3.7 Superadmin Manage Teacher

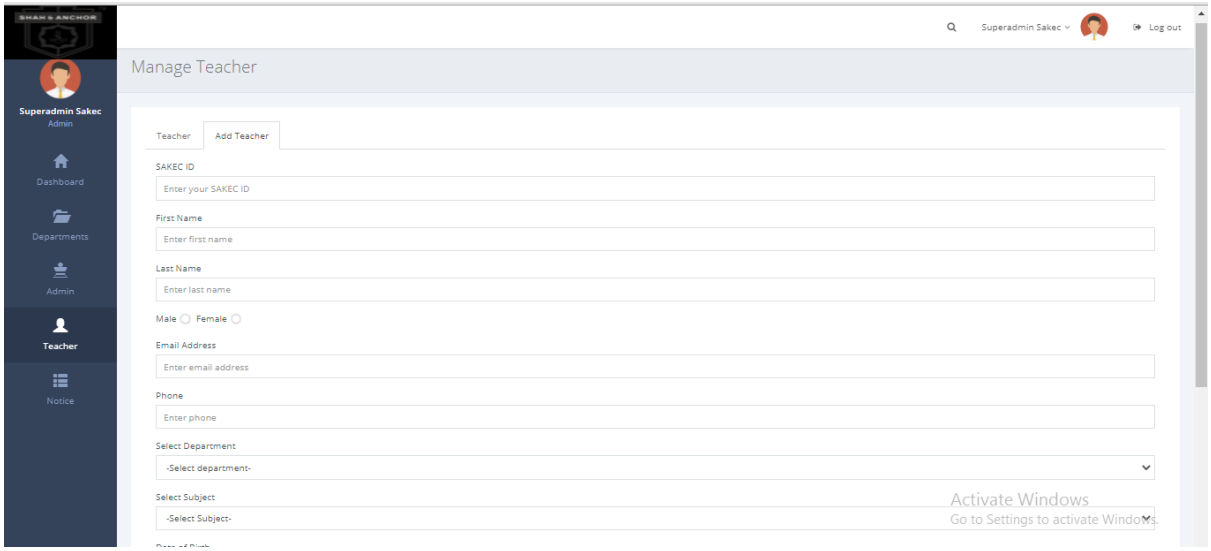

Figure 6.3.8 Superadmin Add Teacher

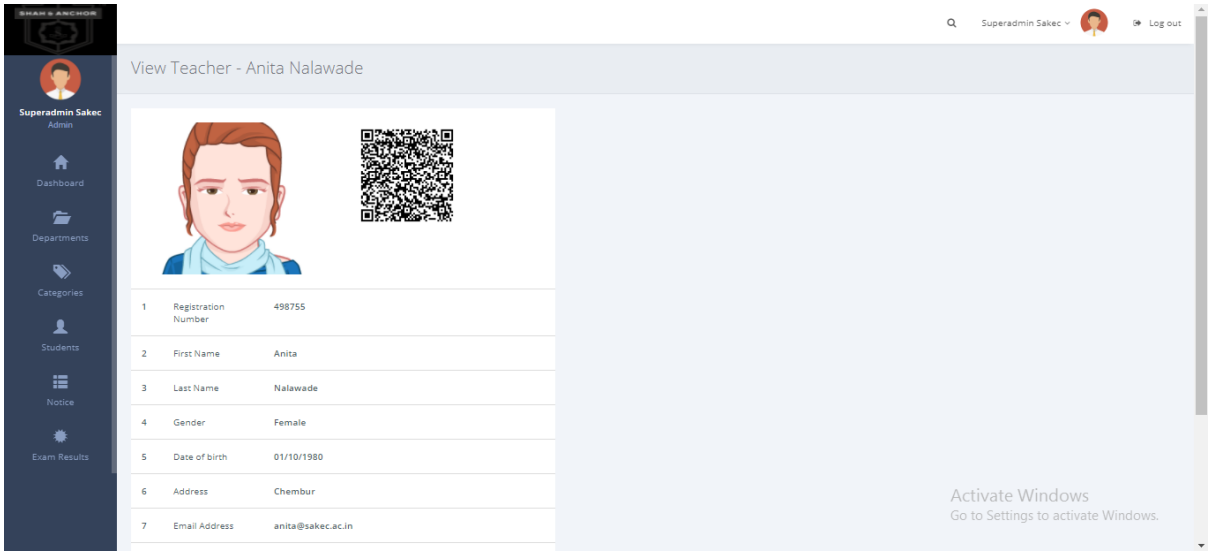

Figure 6.3.9 Superadmin View Teacher

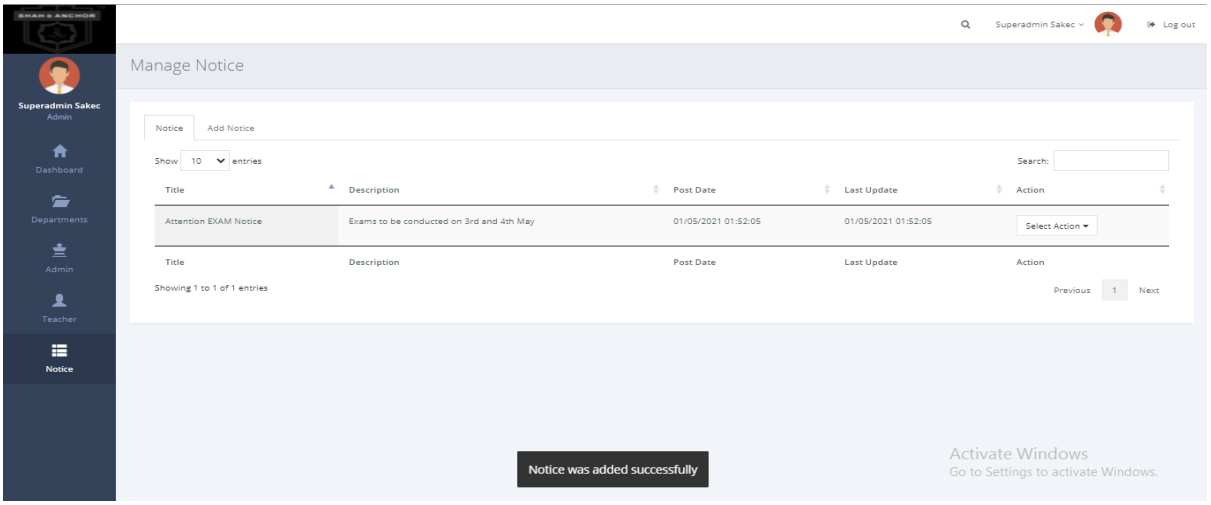

Figure 6.3.10 Superadmin Manage Notice

6.4 Admin module

The admin comes second in the hierarchy, he/ she is the department head and has control over their department. He can add subjects which are to be taught in his/her department. He can also drop and make subjects inactive.

He can add, edit and drop teachers and students in his department. Also, he can link a teacher to a particular subject. He can add notices similar to the super admin.

He can also see the results of all subjects in his department and can also see a short summary of how all the students have performed in a particular quiz.

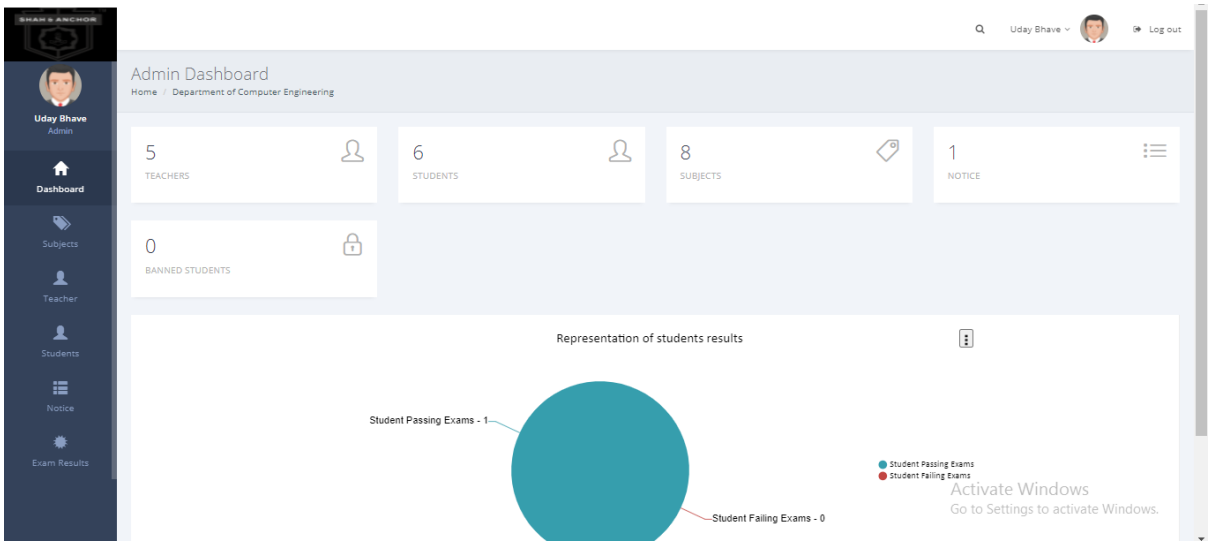

Figure 6.4.1 Admin Dashboard

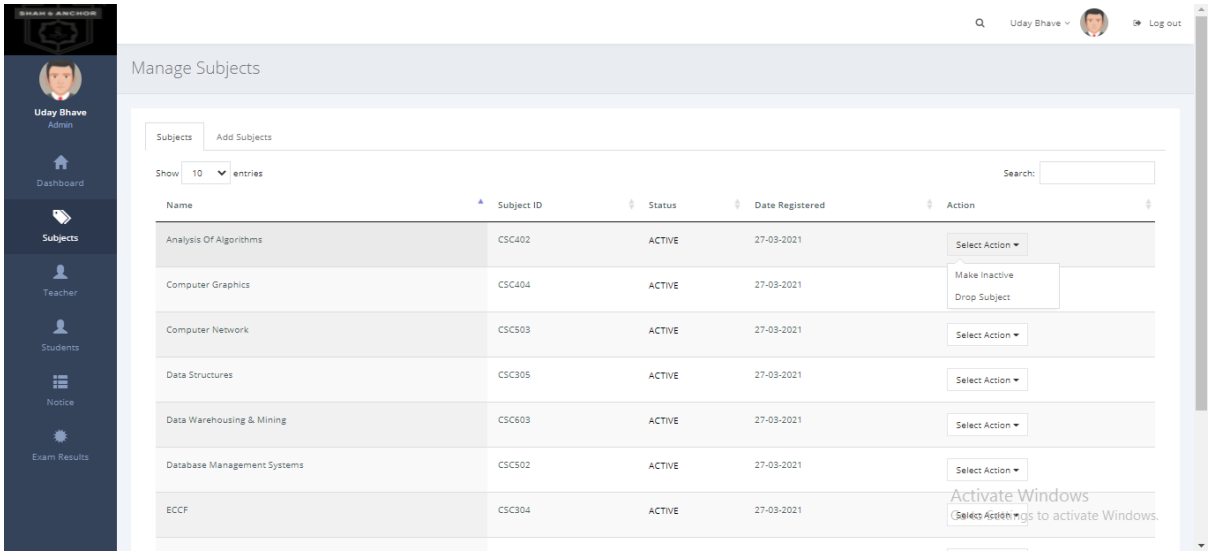

Figure 6.4.2 Admin Manage Subjects

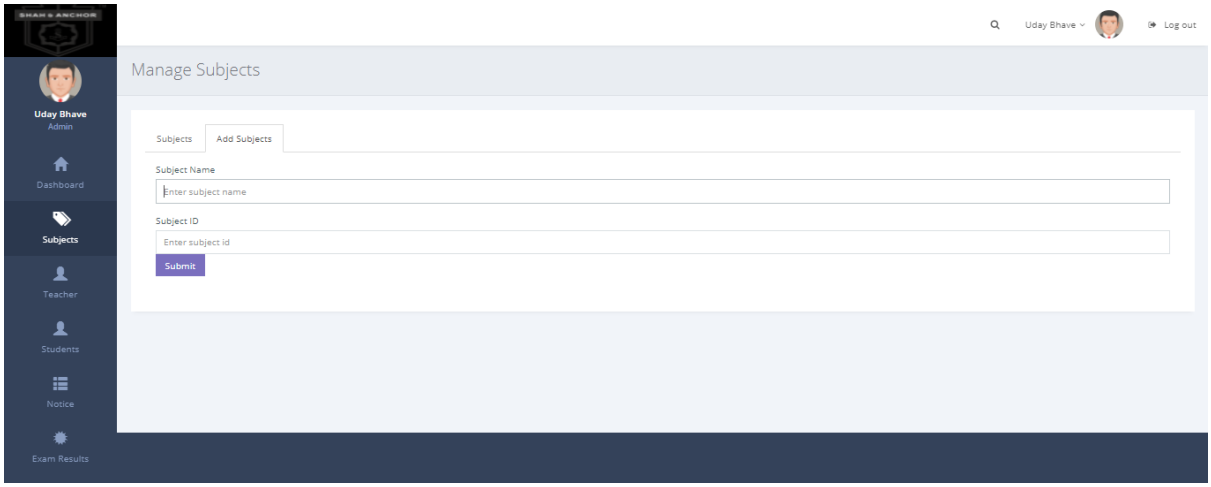

Figure 6.4.3 Admin Add Subjects

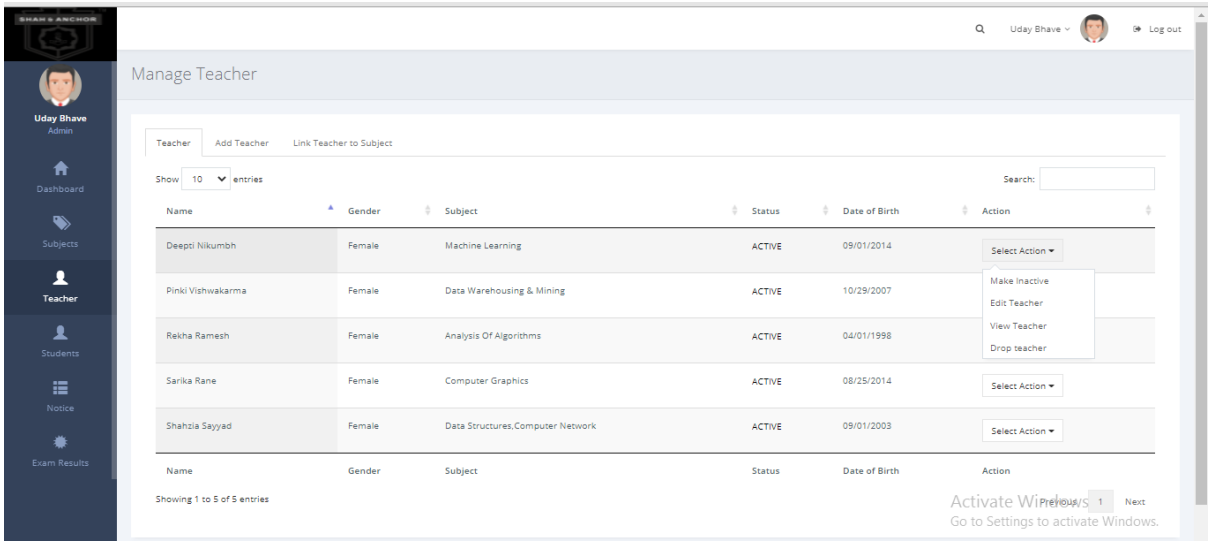

Figure 6.4.4 Admin Manage Teacher

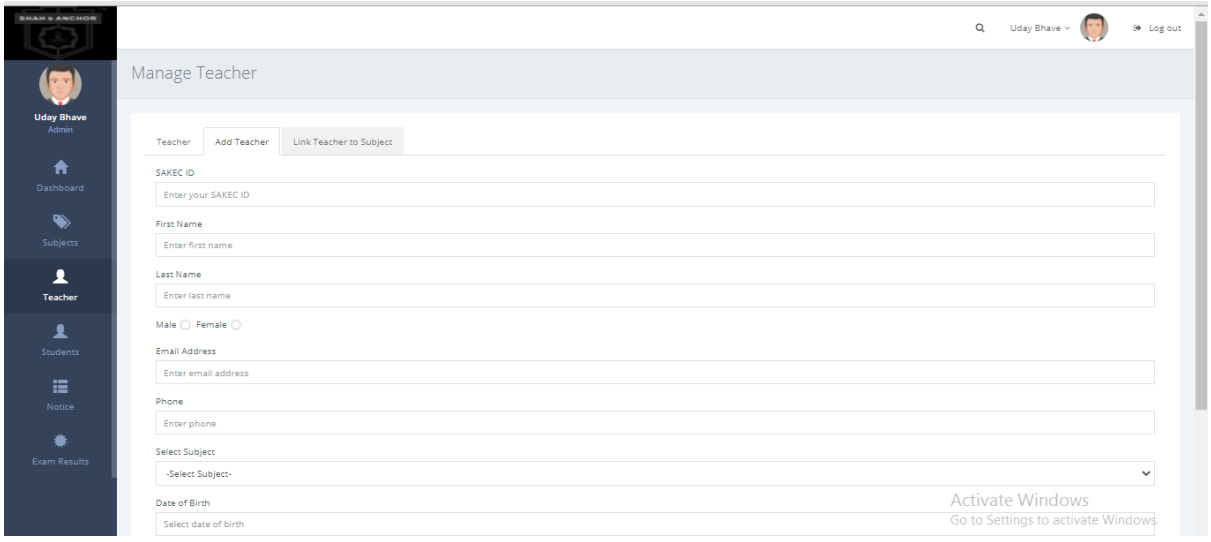

Figure 6.4.5 Admin Add Teacher

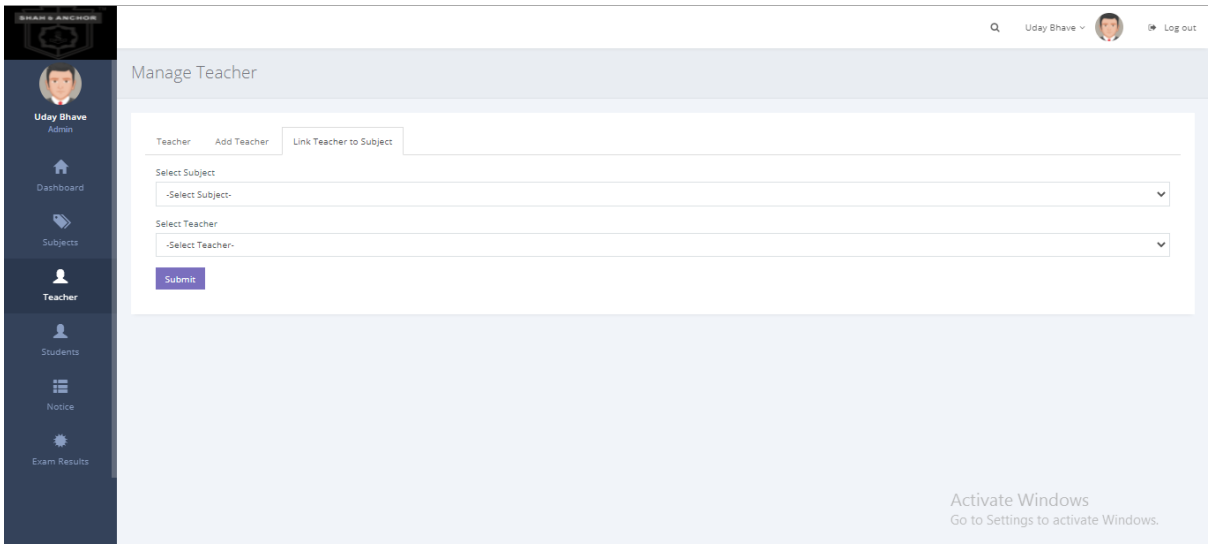

Figure 6.4.6 Admin Link Teacher to Subject

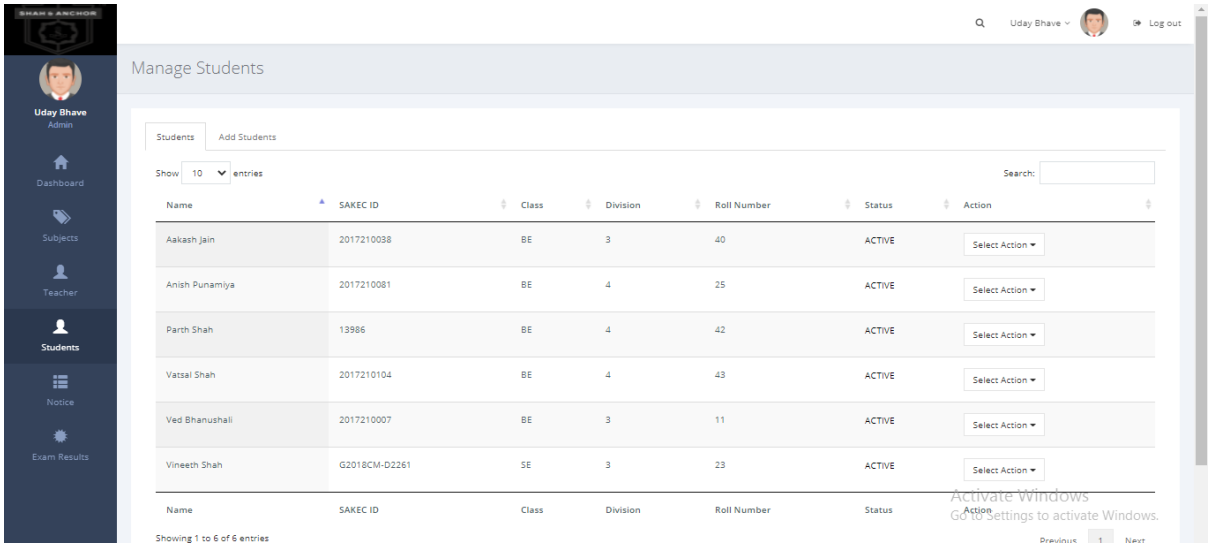

Figure 6.4.7 Admin Manage Students

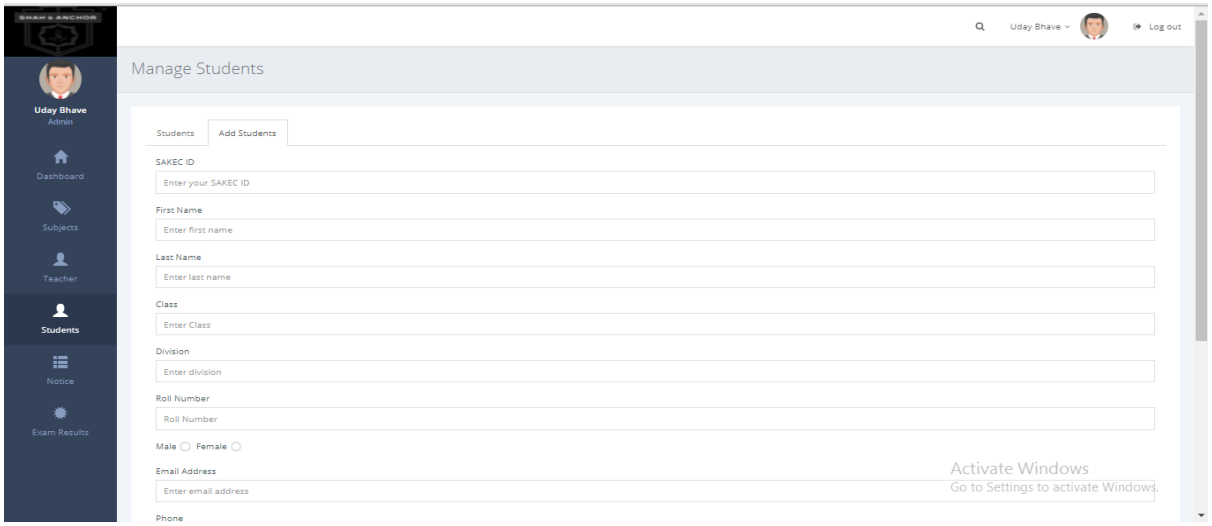

Figure 6.4.8 Admin Add Students

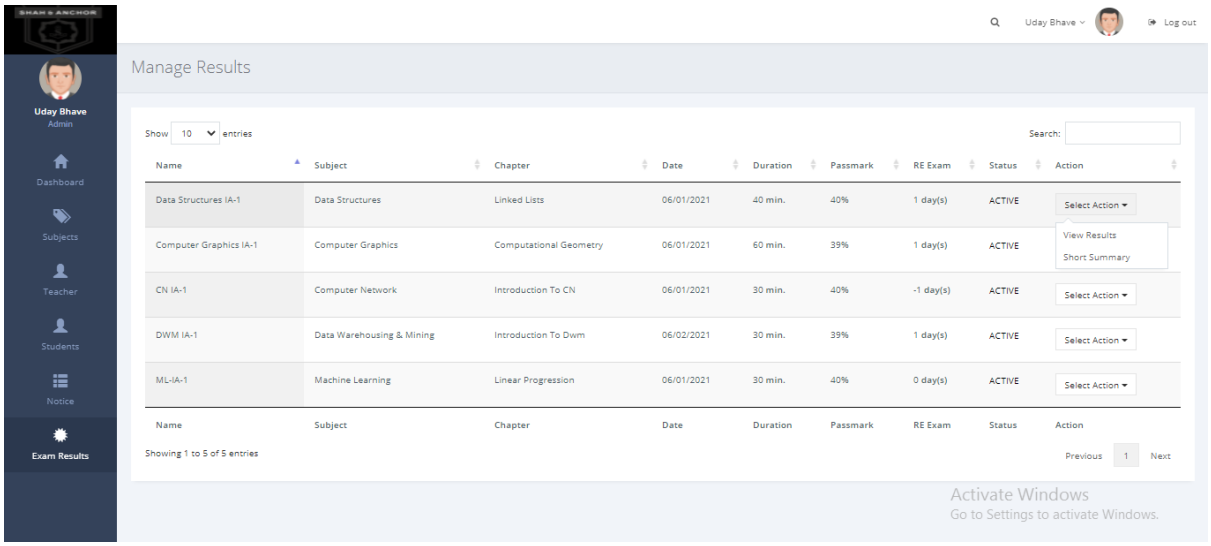

Figure 6.4.9 Admin Manage Results

6.5 Teacher Module

The teacher can view subjects assigned to him/her and in the dashboard can see several students in her class the number of subjects assigned to him/her and she can also see banned students and all the questions created by him/her.

The teacher can add chapters for a subject and they can drop and make a chapter active or inactive. The teacher can add and drop students just like admin.

Also, the teacher can add examinations according to chapters and subjects. Also, she can assign an examination to a particular class of students. She can edit the exam details and set the deadline for the same.

A teacher is also the one who adds questions to the quiz she/he has 3 question types to choose from. She/he has various tools to add questions to the quiz like Speech t text and optical character recognition. She also has the option to view the quiz as in how the quiz would appear to students and can edit the quiz in the same frame. She can also see results similar to the Admin

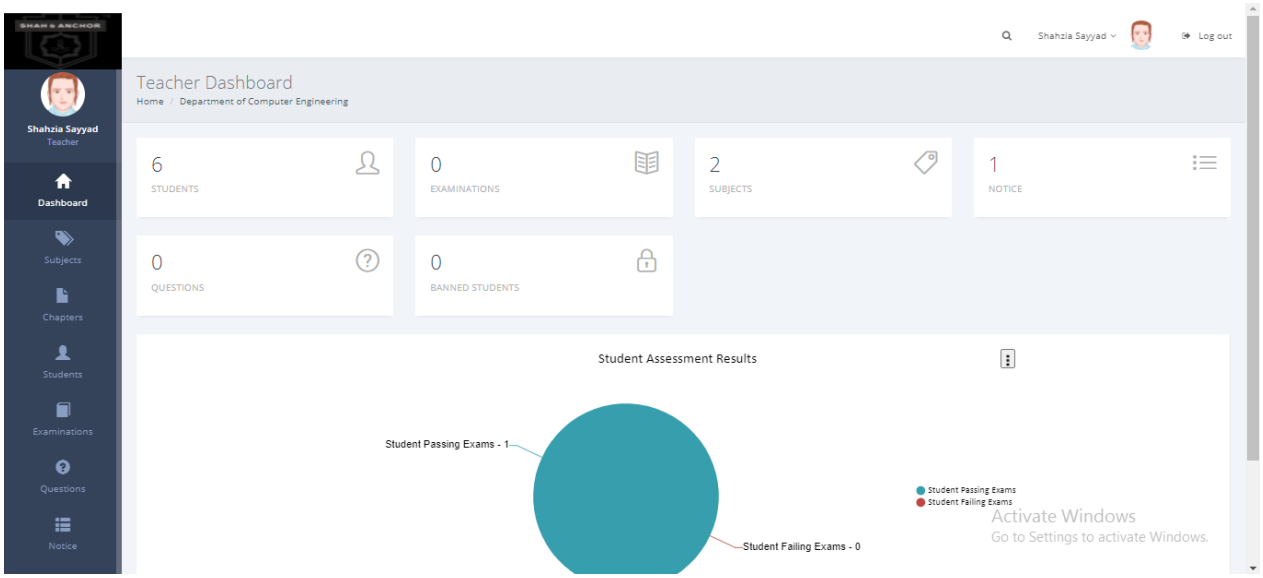

Figure 6.5.1 Teacher Dashboard

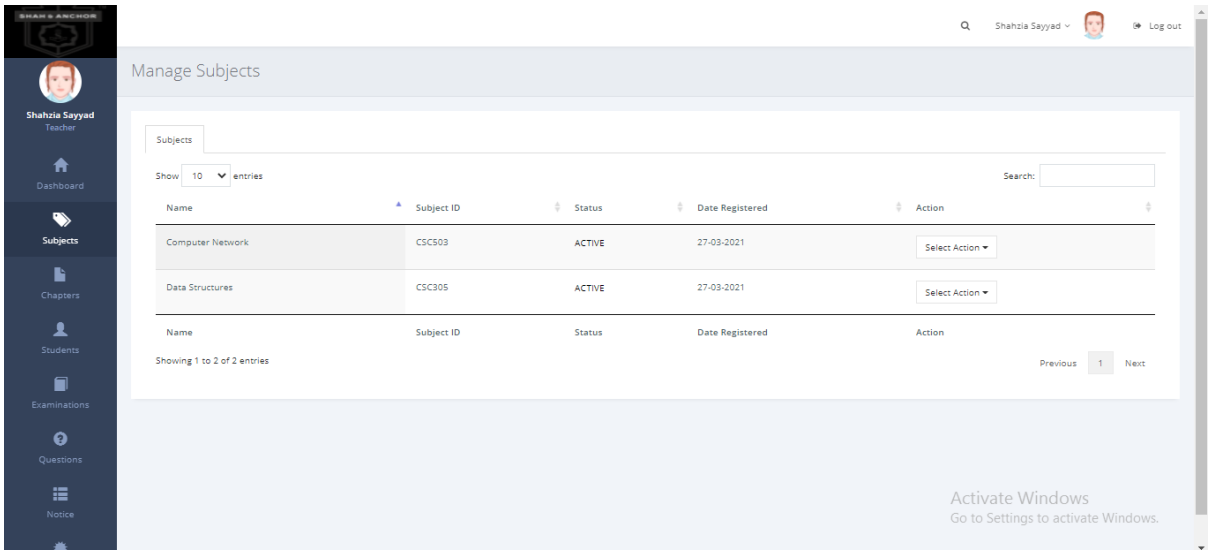

Figure 6.5.2 Teacher Manage Subjects

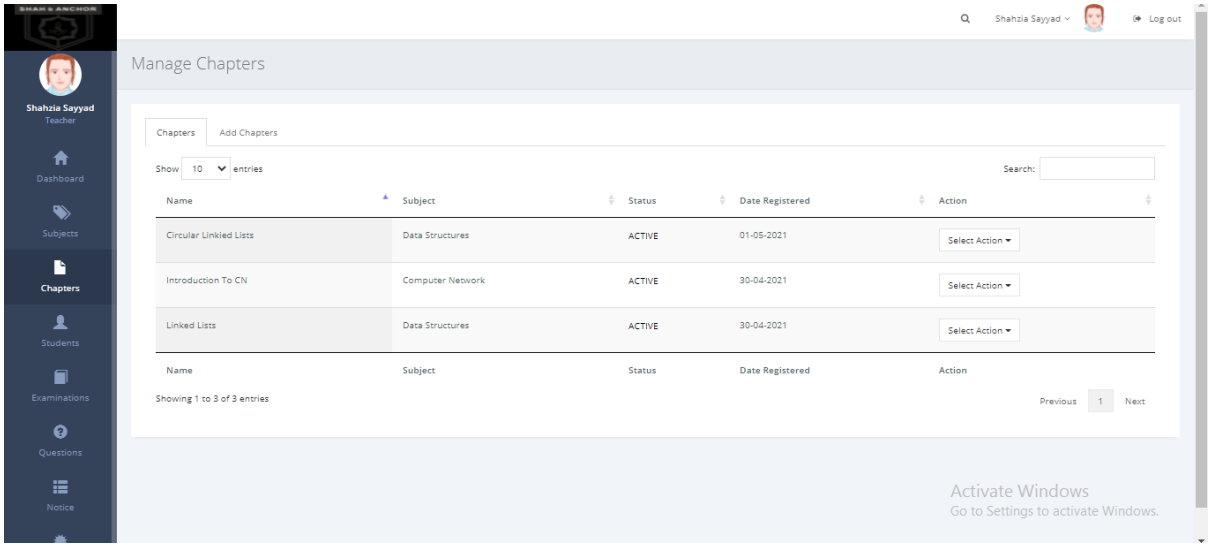

Figure 6.5.3 Teacher Manage Chapters

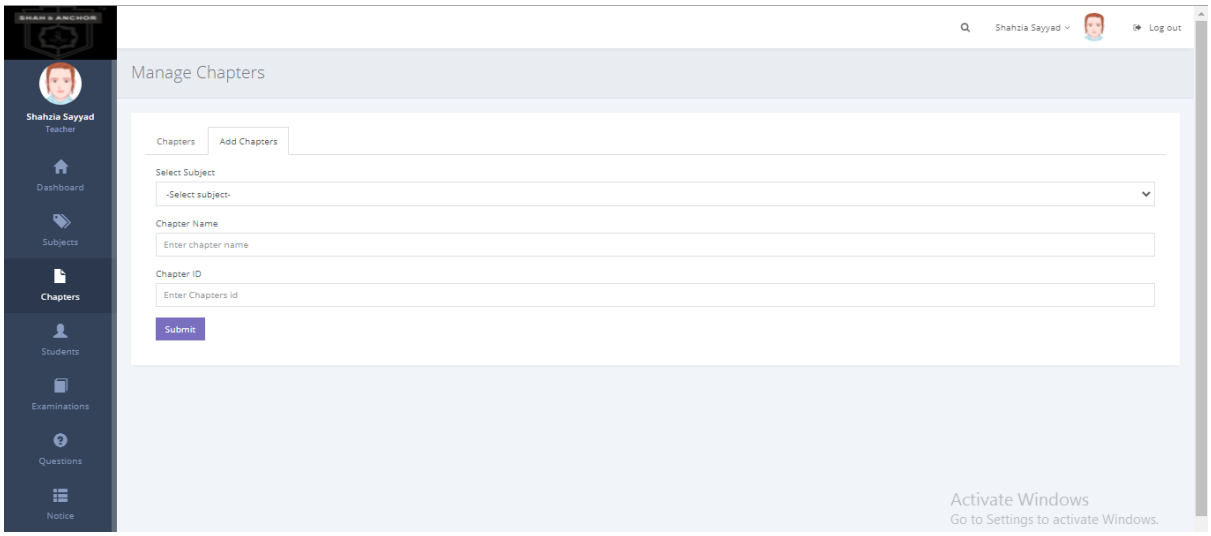

Figure 6.5.4 Teacher Add Chapters

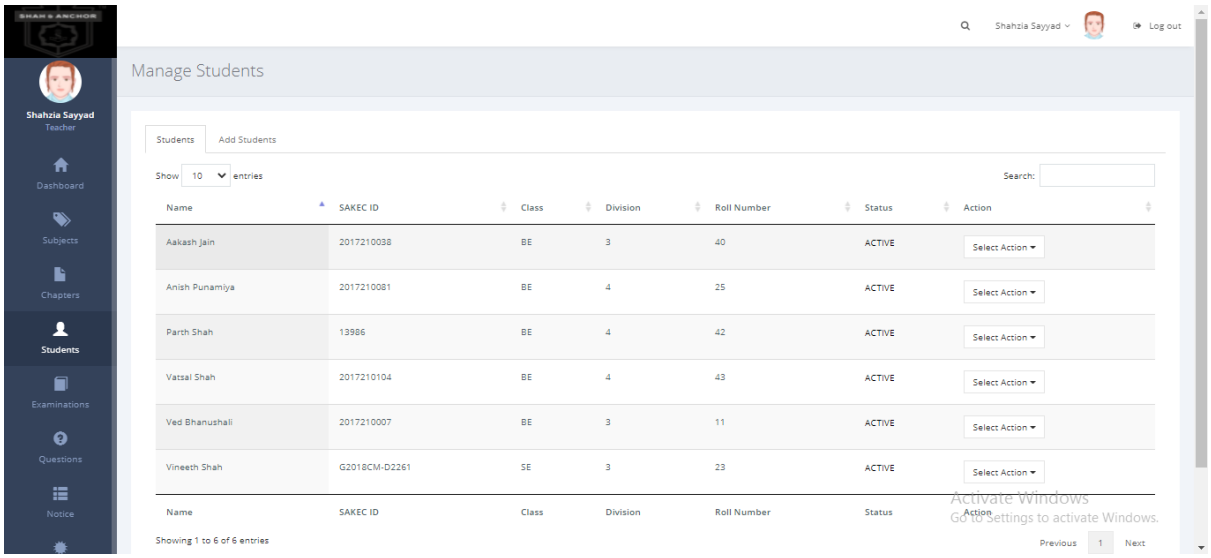

Figure 6.5.5 Teacher Manage Students

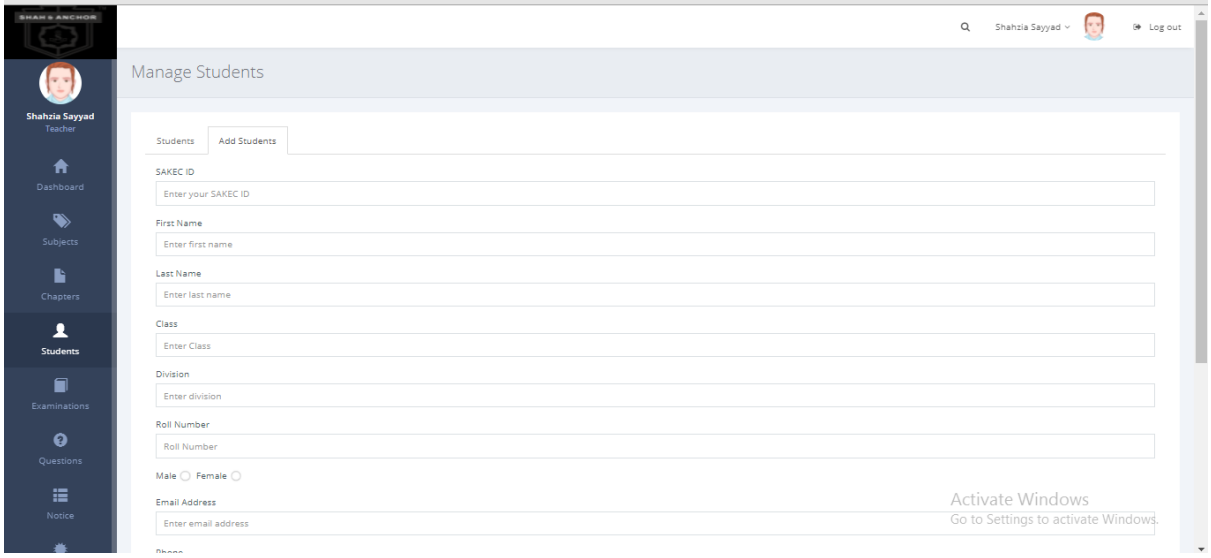

Figure 6.5.6 Teacher Add Students

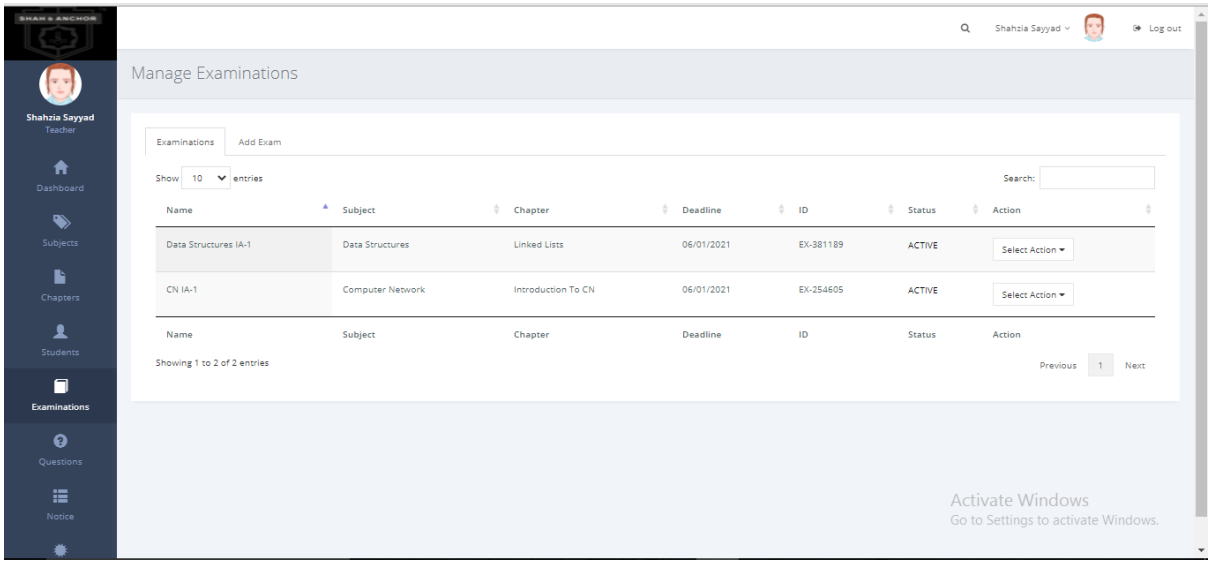

Figure 6.5.7 Teacher Manage Examinations

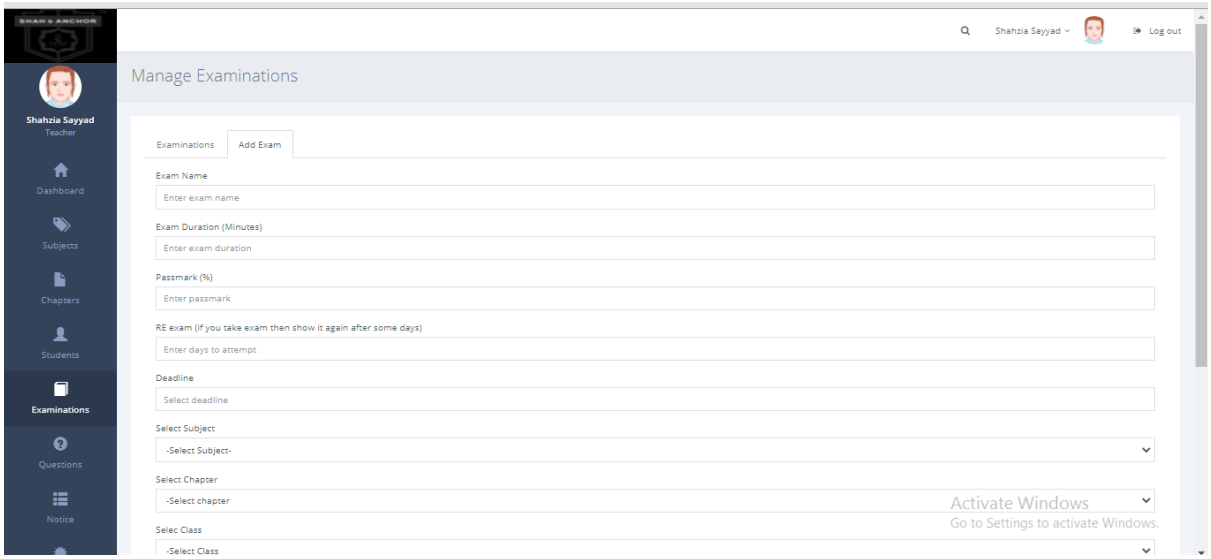

Figure 6.5.8 Teacher Add Exam

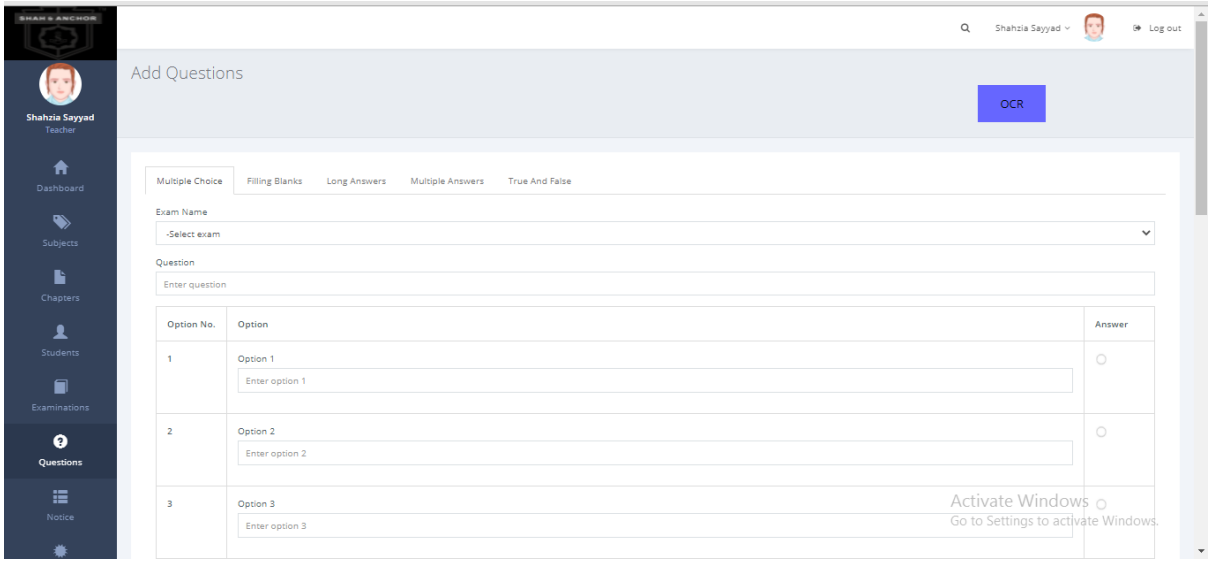

Figure 6.5.9 Teacher Add Questions-1

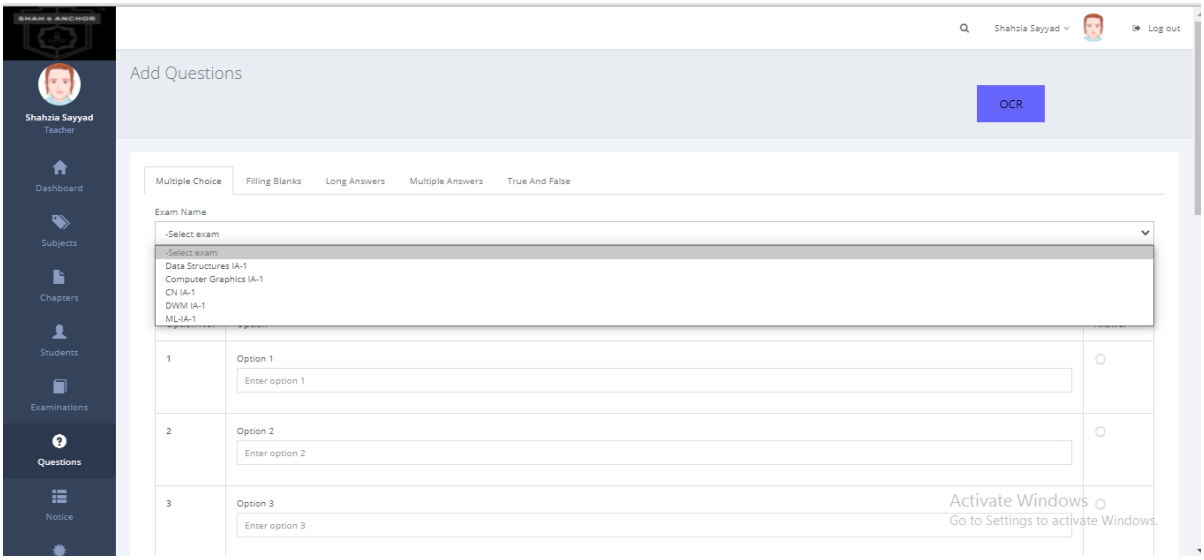

Figure 6.5.10 Teacher Add Questions-2

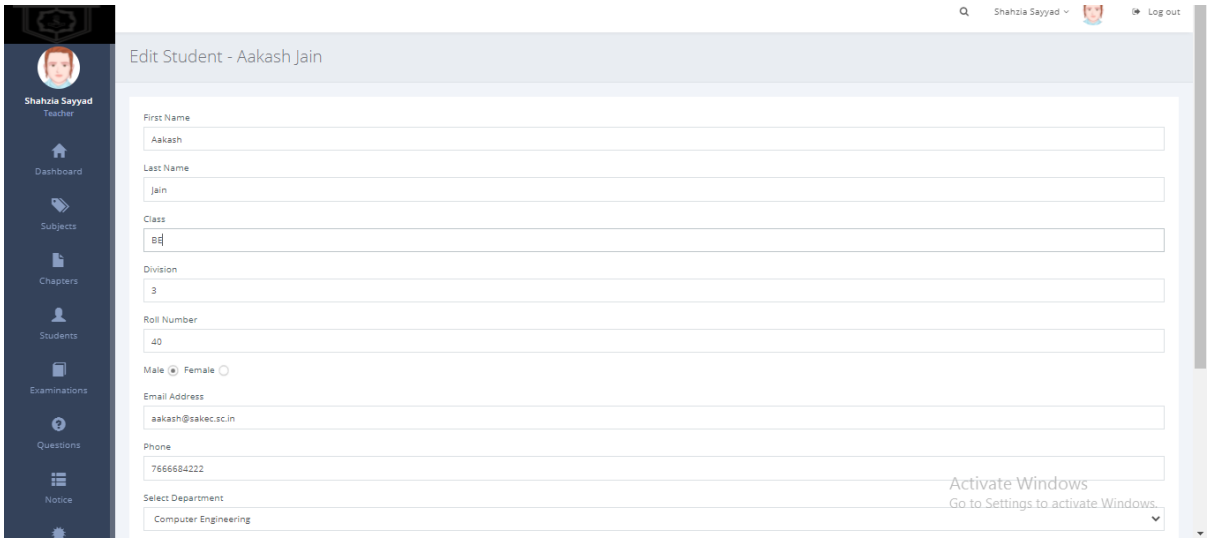

Figure 6.5.11 Teacher Edit Student

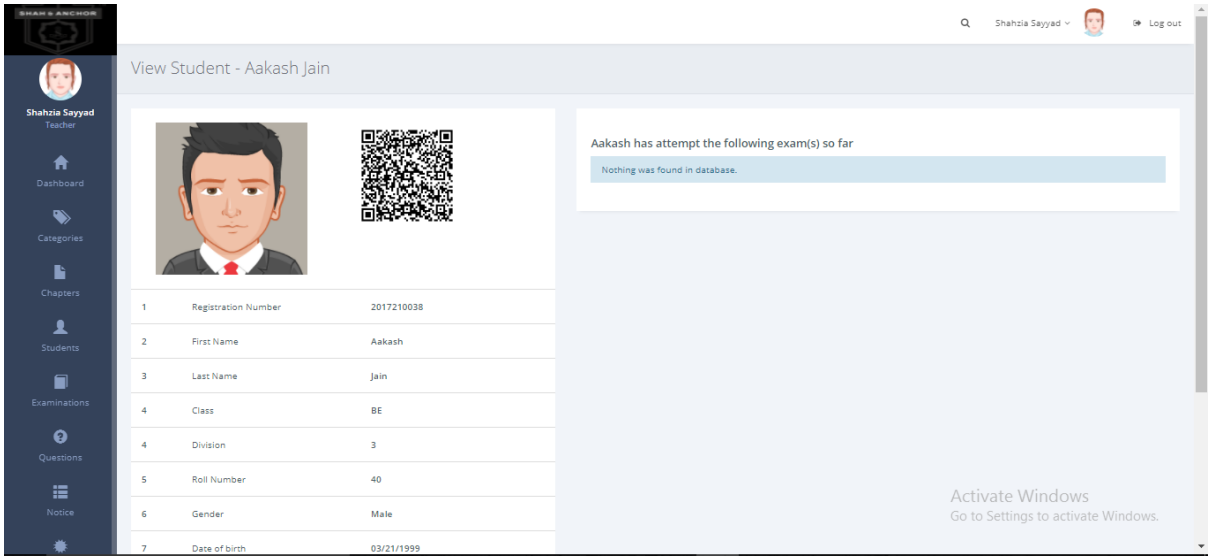

Figure 6.5.12 Teacher View Student

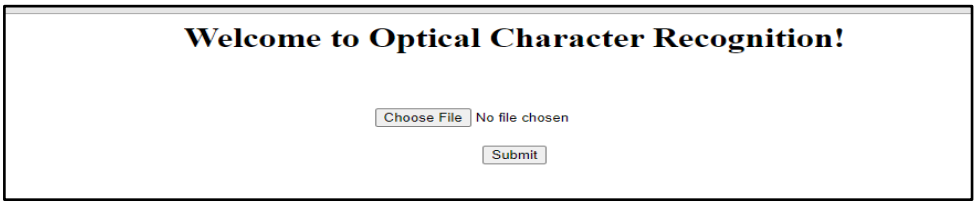

Figure 6.5.13 Teacher Add Question(OCR)-1

Input of OCR

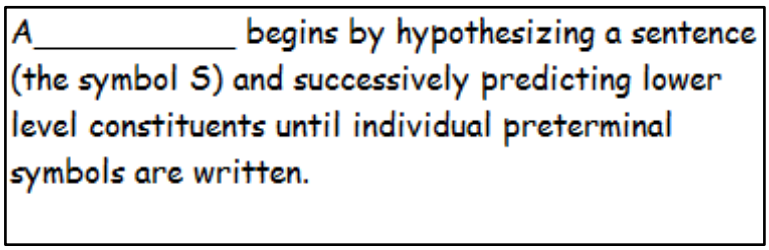

Figure 6.5.14 Teacher Add Question(OCR)-2

Output of OCR

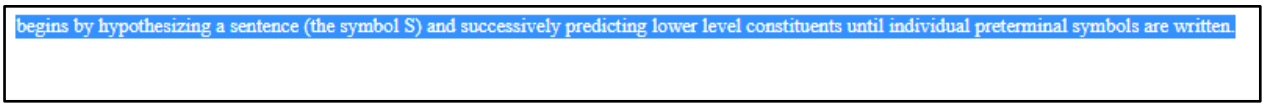

Figure 6.5.15 Teacher Add Question(OCR)-3

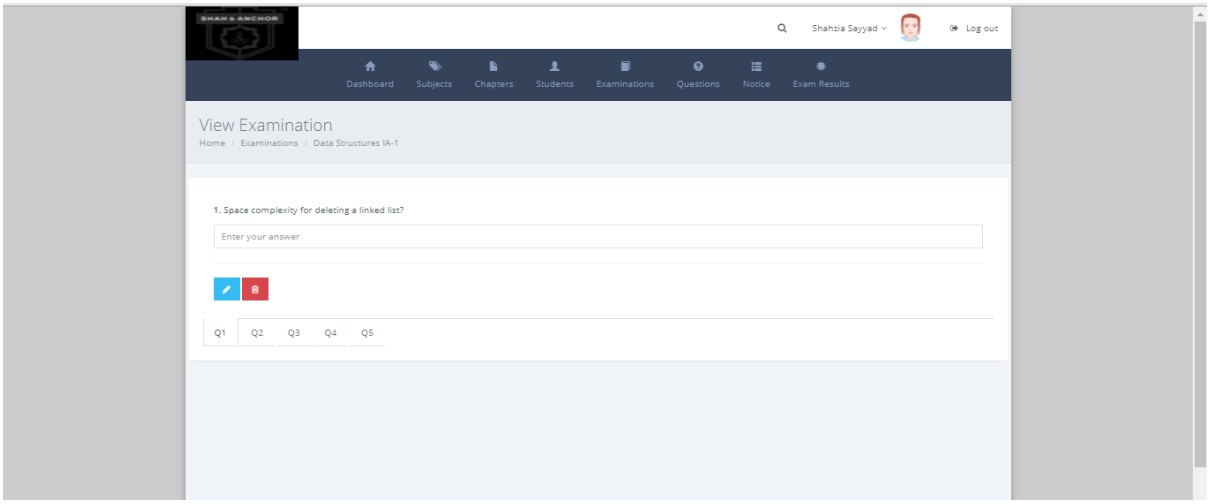

Figure 6.5.16 Teacher View Examination

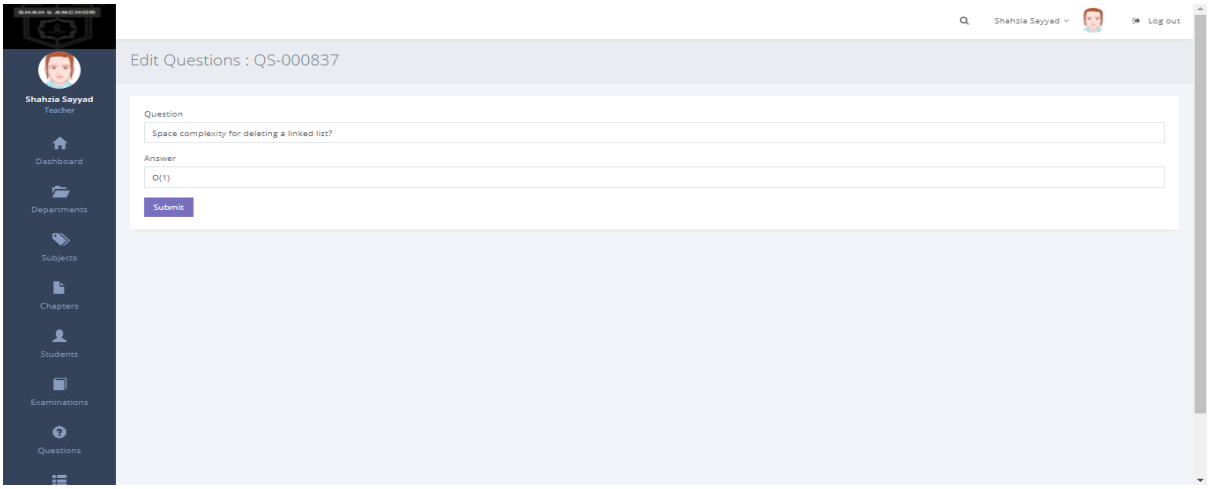

Figure 6.5.17 Teacher Edit Questions

6.6 Student Module

The Student is the lowest on the hierarchy, the student is the one who gives the test made by the teacher.He/She can see how many examinations are to be given, how many students are there in the class.He/She can see notices given by the admin, super admin, and teachers on their dashboard.

The student can also do the practice quiz instead of giving in the actual quiz if he /she wish to practice a particular chapter.He/She can also see their quiz results and evaluate their weaknesses and try to become better.

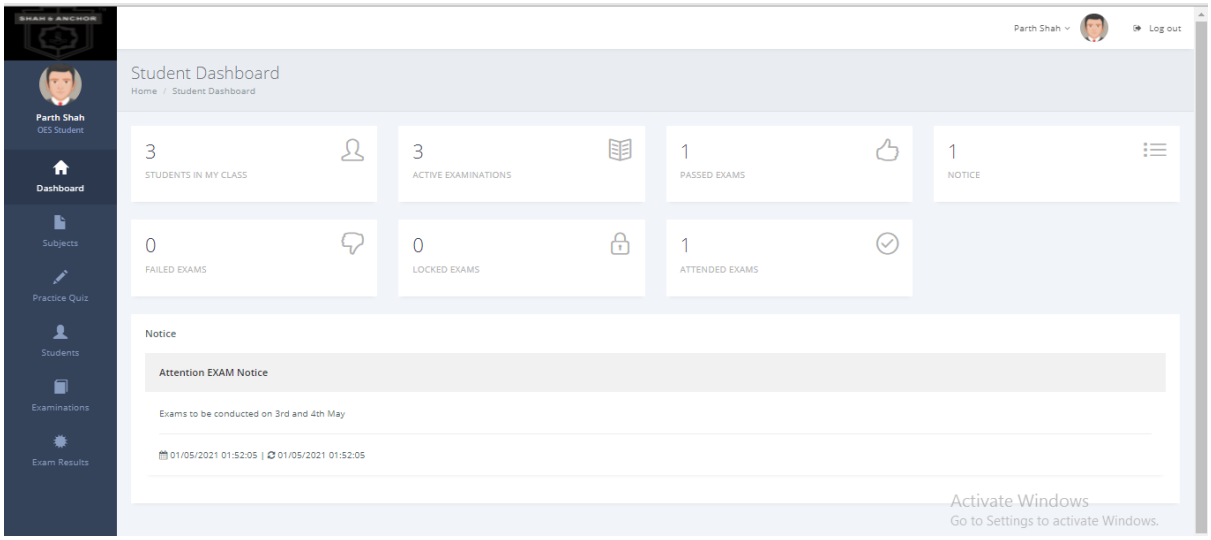

Figure 6.6.1 Student Dashboard

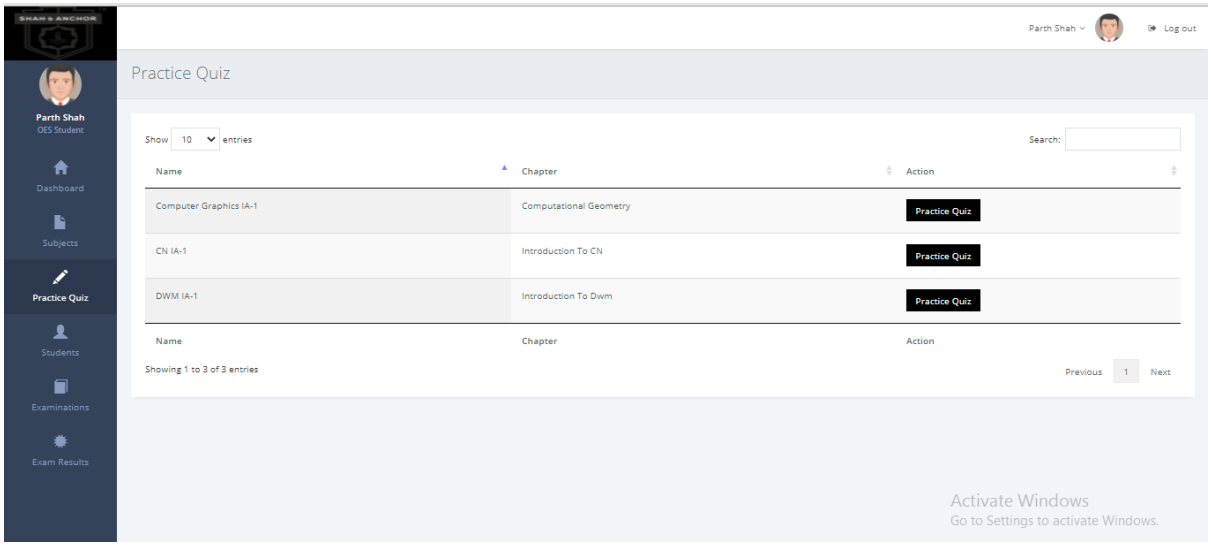

Figure 6.6.2 Student Practise Quiz-1

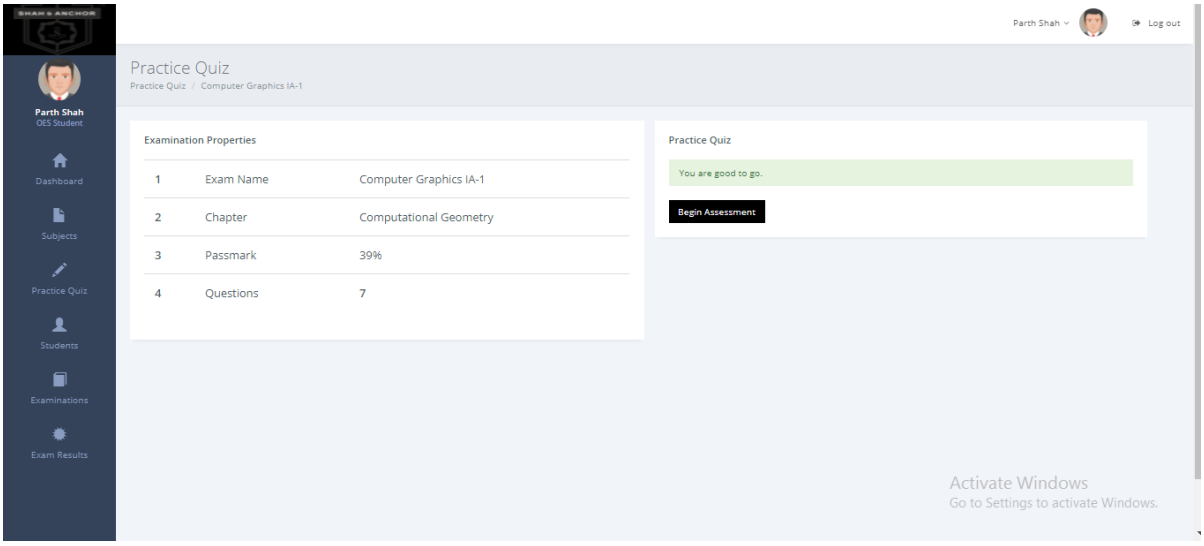

Figure 6.6.3 Student Practise Quiz-2

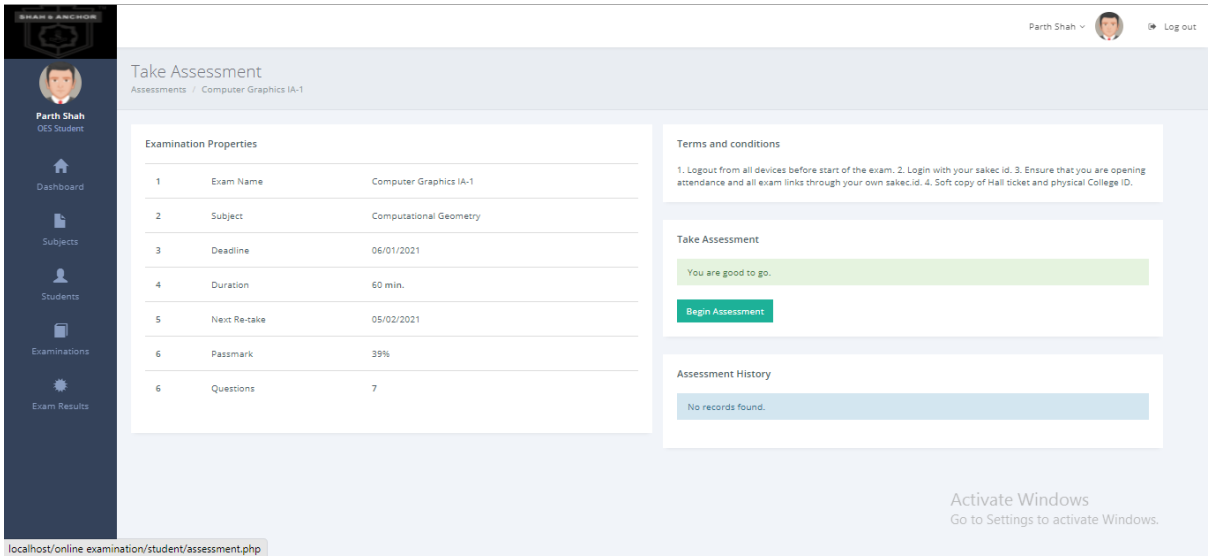

Figure 6.6.4 Student Take Assessment-1

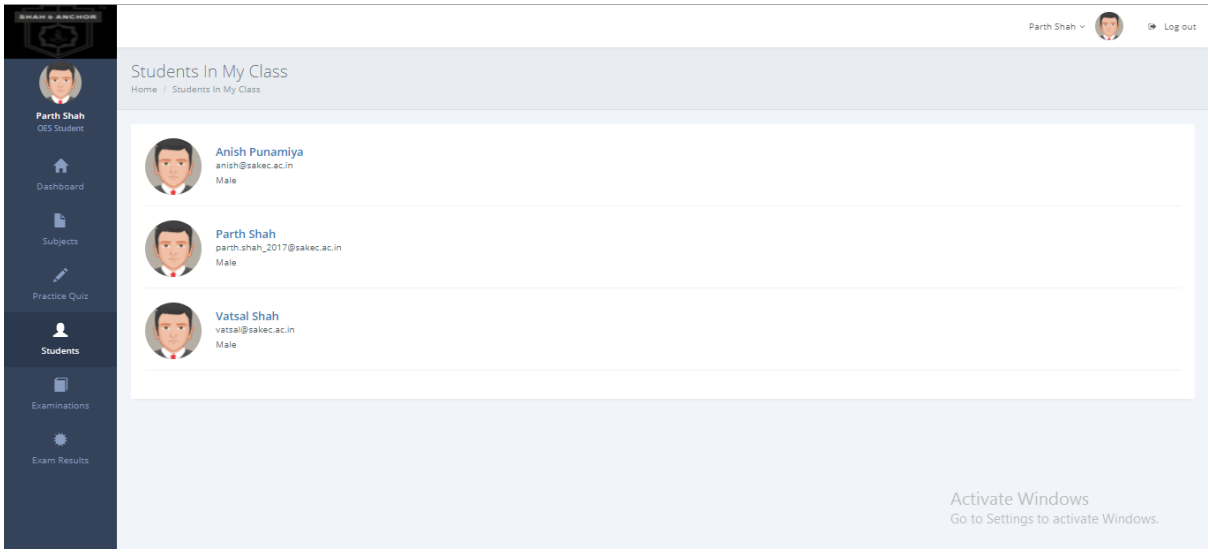

Figure 6.6.5 Student in my class

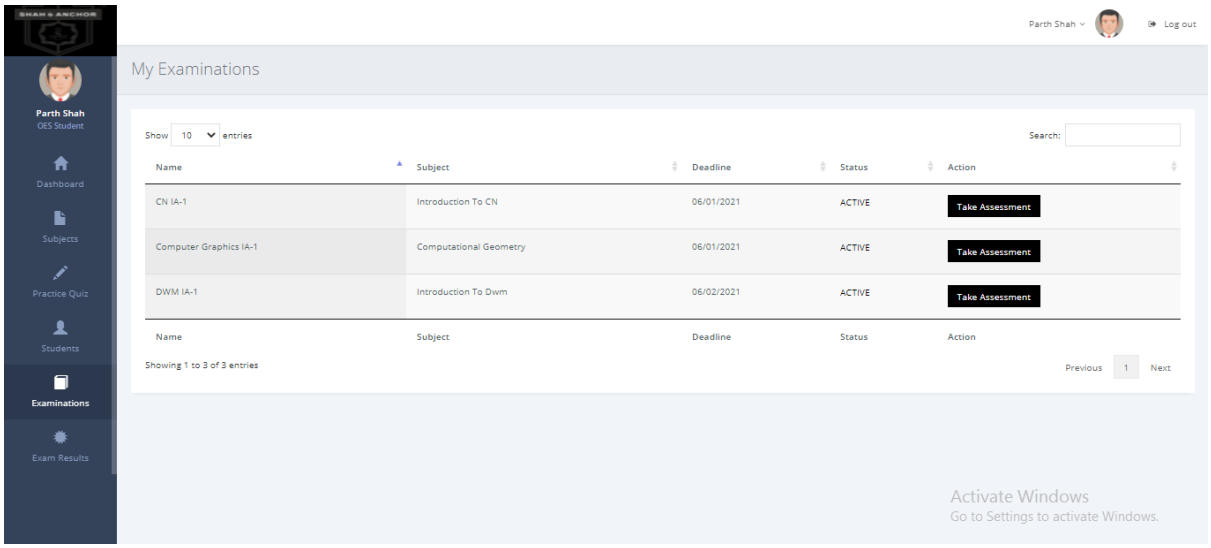

Figure 6.6.6 Student My Examinations

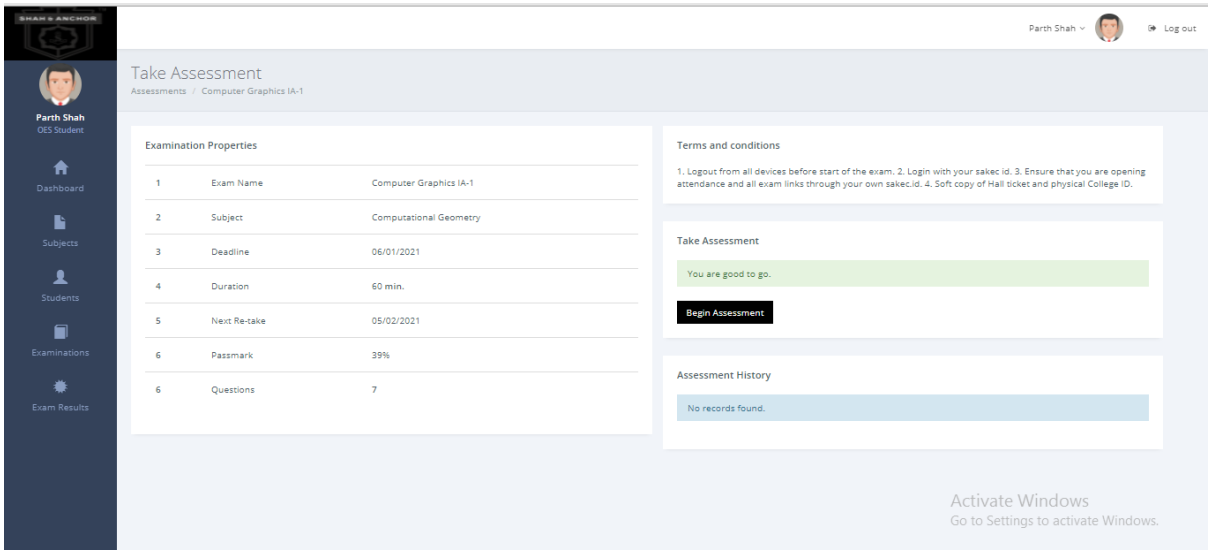

Figure 6.6.7 Student Take Assessment

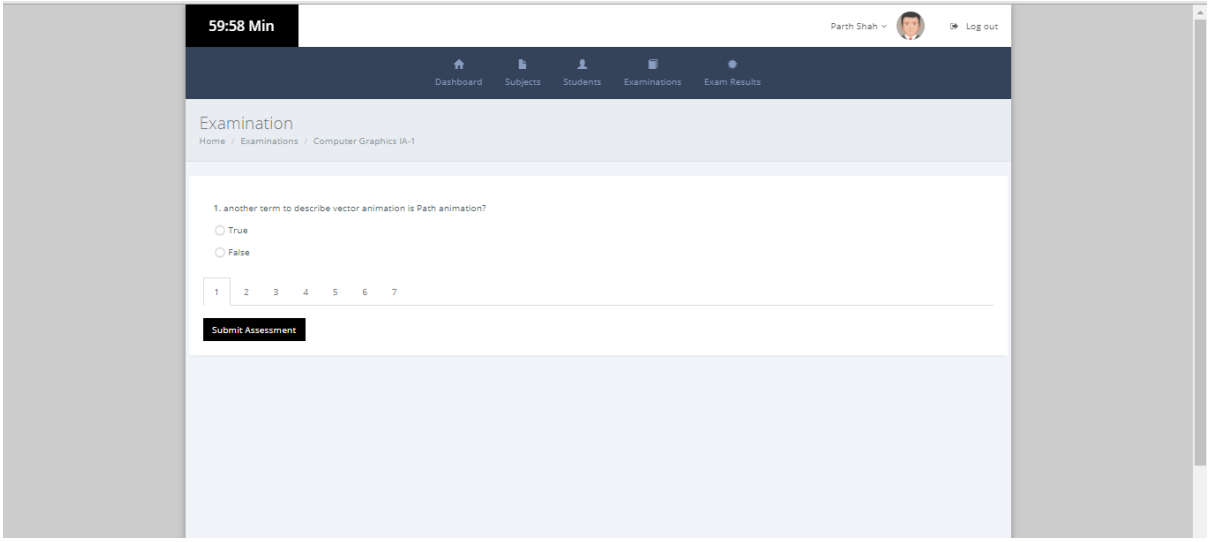

Figure 6.6.8 Student Examination-1

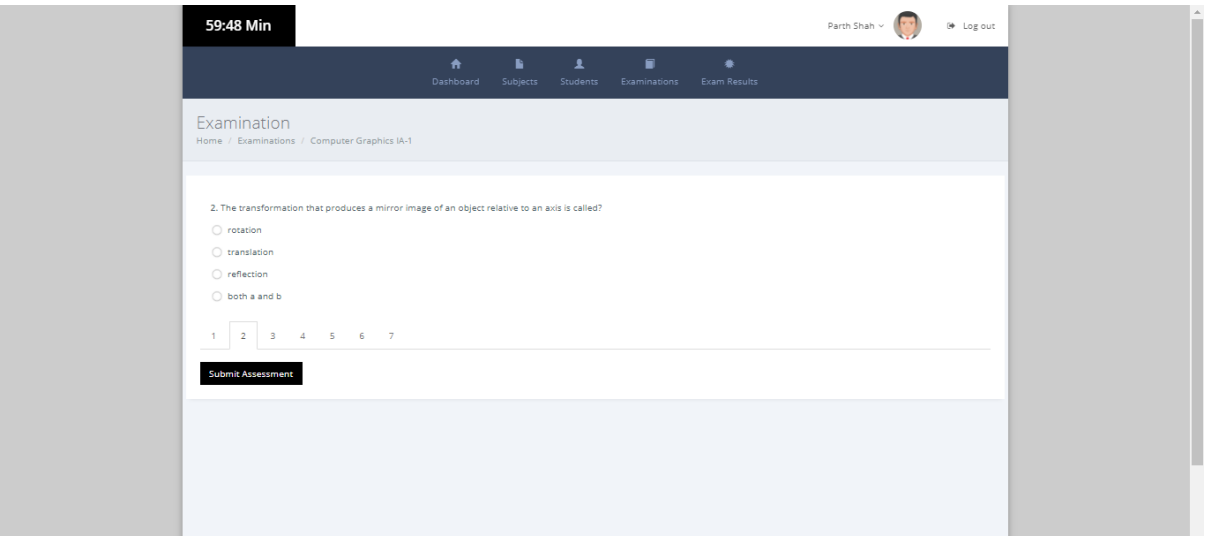

Figure 6.6.9 Student Examination-2

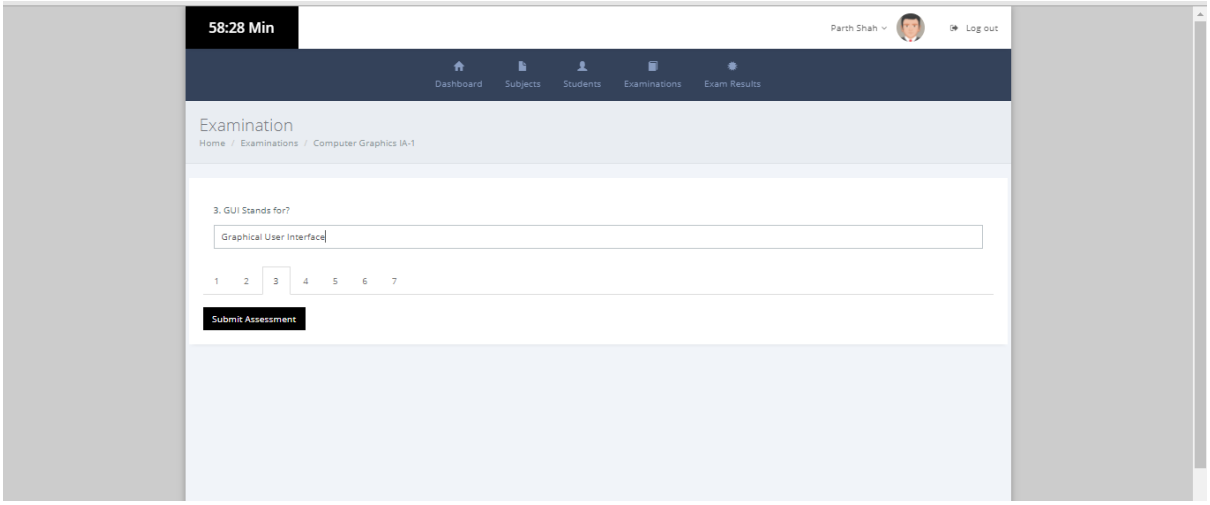

Figure 6.6.10 Student Examination-3

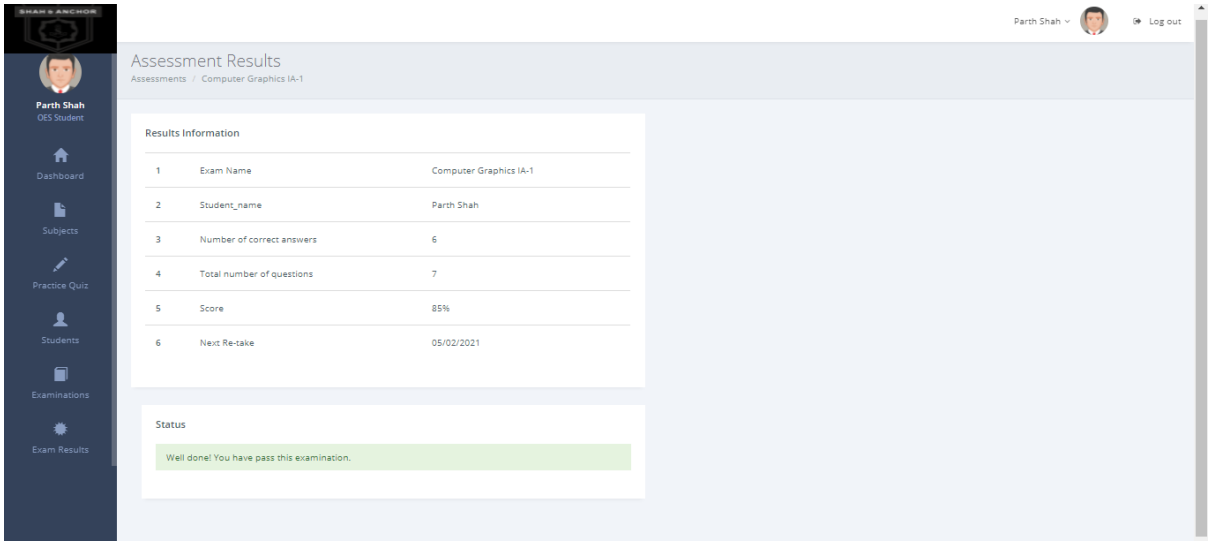

Figure 6.6.11 Student Assessment Results

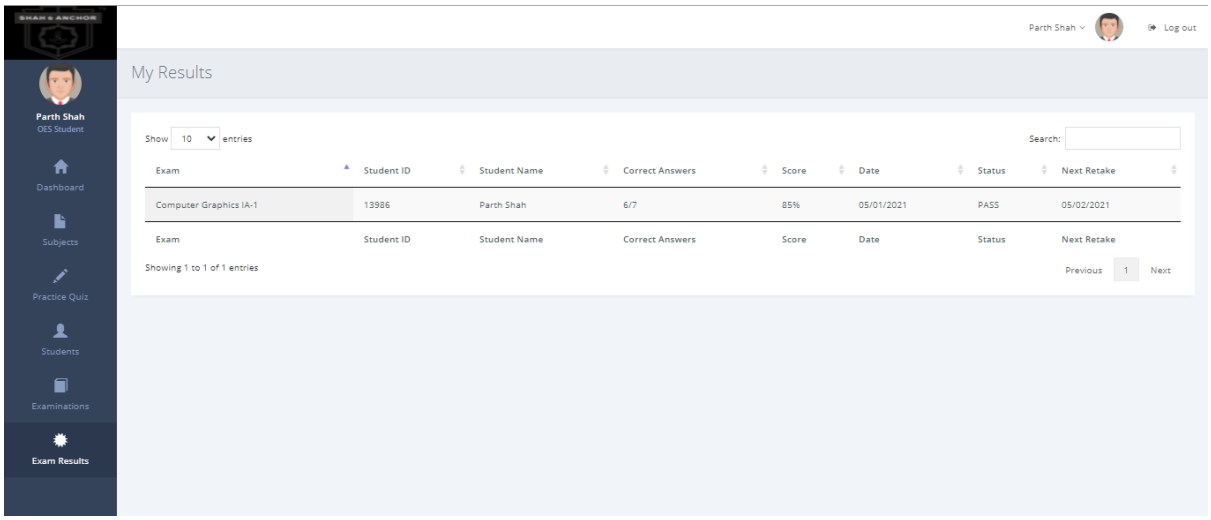

Figure 6.6.12 Student My Results

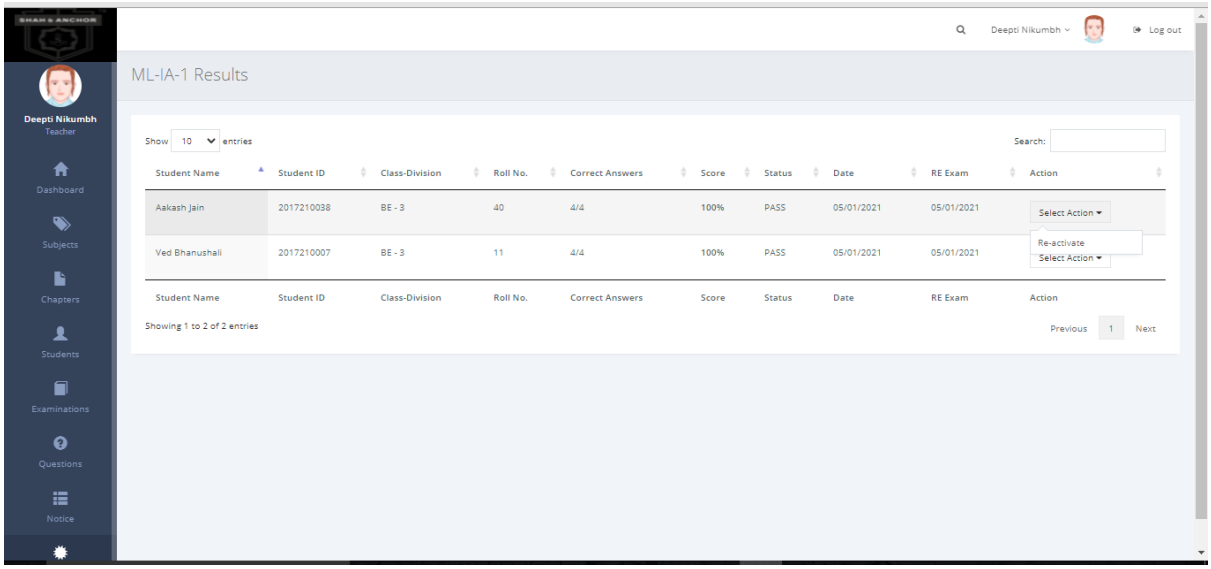

Figure 6.6.13 Student Test Results

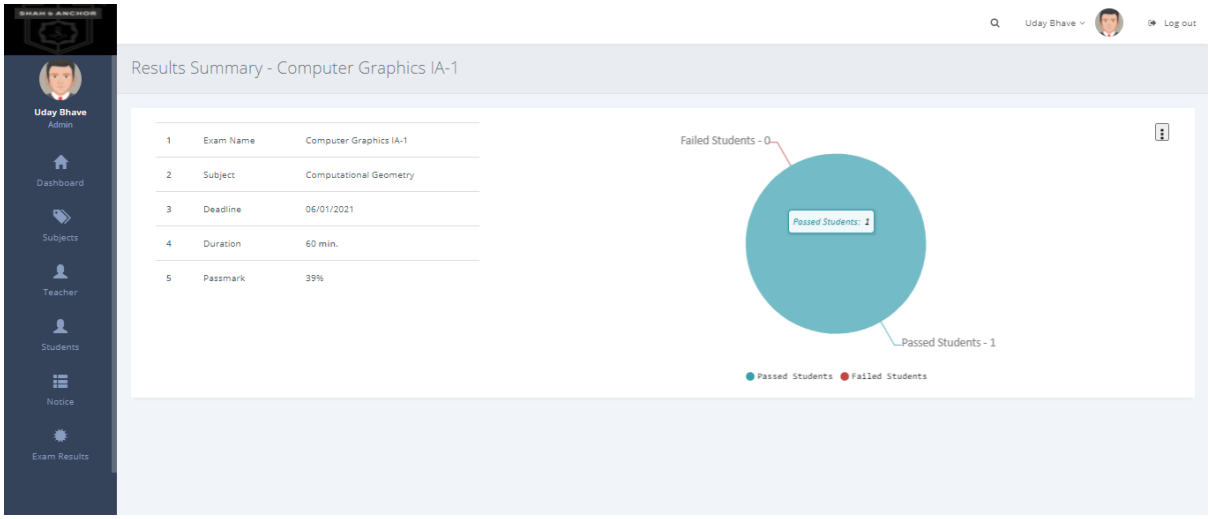

Figure 6.6.14 Student Result Summary

Chapter 7

Testing

Test Cases

Test Case ID	Objective	Steps / Description	ExpectedOutput	Actual Output	Result	Remark
1	Sign Up	Fill Form	User Created	User Created	Successful	
2	Login	Enter Credentials	Logged In	Logged In	Successful	OTP Verification
3	Change Password	Enter new Password	Password Changed	Password Changed	Successful	
4	Manage Departments	Create and View Departments	Departments created and can be viewed	Departments created and can be viewed	Successful	
5	Manage Admins	Create and View Admins	Admins created and can be viewed	Admins created and can be viewed	Successful	Can be done only by SuperAdmin
6	Manage Teacher	Create and View Teacher	Teachers created and can be viewed	Teachers created and can be viewed	Successful	
7	Manage Notice	Send Notice to Students	Students receive Notice	Students receive Notice	Successful	
8	Manage Subjects	Subjects can be created and viewed	Subjects created and can be viewed	Subjects created and can be viewed	Successful	
9	Link Subjects to Teacher	Subjects can be Linked to	Subjects Linked to	Subjects Linked to	Successful	Can be done only by

		Teacher	Teacher	Teacher		Admin
10	Manage Students	Students can be added and viewed	Students added and can be viewed	Students added and can be viewed	Successful	
11	Manage Chapters	Chapters can be added and viewed	Chapters added and can be viewed	Chapters added and can be viewed	Successful	Can be done only by Teacher
12	Manage Exam-inations	Exam-inations can be added and viewed	Exam-inations added and can be viewed	Exam-inations added and can be viewed	Successful	Can be done only by Teacher
13	Addand edit Questions	Questions can be added, edited and viewed	Questions added, edited and can be viewed	Questions added, edited and can be viewed	Successful	Can be done only by Teacher
14	OCR	Image scanned for Recognition	Gives text present in image	Gives text present in image	Successful	
15	View Exam-inations	Preview Exam-inations	Can preview examination with questions	Can preview examination with questions	Successful	Can be done only by Teacher
16	Practice Quiz	Quiz given as Practice	Practice Quiz can be attempted	Practice Quiz can be attempted	Successful	Can be done only by Students
17	Exam-inations	Exam-inations Quiz can be given	Practice Quiz can be attempted	Practice Quiz can be attempted	Successful	Can be done only by Students
18	Assessment Results	Results can be viewed	Results can be viewed	Results can be viewed	Successful	

Chapter 8

Results & Analysis

We have proposed and designed a game-based pedagogy system using features like OCR (Optical Character Recognition) and Speech to Text Recognition. Our system allows for various user categories namely super admin, admin, teacher and student. Each of these users can login using their own registration number or email. An OTP verification is done for the user. User has access to a dashboard which has the user profile showing all the details of the user.

Super admin has overall system access and can add various departments and admins. Admins can add various teachers and students of his department. Admin can also associate teacher with one or more subjects. Teacher can add/modify students and can create various tests for his/her subjects and add questions in the test. Teacher can set a deadline, test timer, number of attempts and whether to allow re-take of the test. Teacher can also view the student result for a particular test and analyze it. Students can give tests in two modes-practice mode and examination mode. They can view their results after the test. Every user has a notification option where he/she can be informed about any upcoming news by the respective heads.

Our key highlights include implementation of the OCR feature which allows easy test creation. The OTP based verification gives added security to the system. A QR code is generated for every user and displayed along user profile which can be scanned to quickly obtain user details.

All these features collectively aim to reduce the human efforts needed for a test creation and improve an individual’s performance by continuous evaluation.

Chapter 9

Conclusion and Future Scope

Conclusion:

Game Based learning improves student commitment and engagement by making the learning experience playful and dynamic for overcoming various challenges. It plays an important role in teaching by making students collaborate, communicate and interact with the class. This research proposed the need of a new system of learning with various features like OCR, Speech-to-Text Recognition which can be very helpful for teachers in preparing any test paper by reducing the manual work of typing the questions and directly uploading them in any test or adding it to the pool of questions.

Future Scope:

As there are continuous advancements in the field of education and everything is happening online, this project model has a huge future scope.Many more features like anti-cheating tools like the usage of camera can be used for constant assessment of students while they appear for test. Features like prohibition of tab switching during an ongoing test can be implemented.

Every question can be given a set of difficulty level which is set initially by the teacher but later auto updates itself by collecting data from student reports and using various dynamic algorithms. More question types like audio/video questions can be added to the system and it can be made more dynamic. Images can be attached with every question for visualizing the questions. More analysis could be done on student report. Addition of the above features would make the system almost perfect for the assessment of progress evaluation of an individual.

Chapter 10
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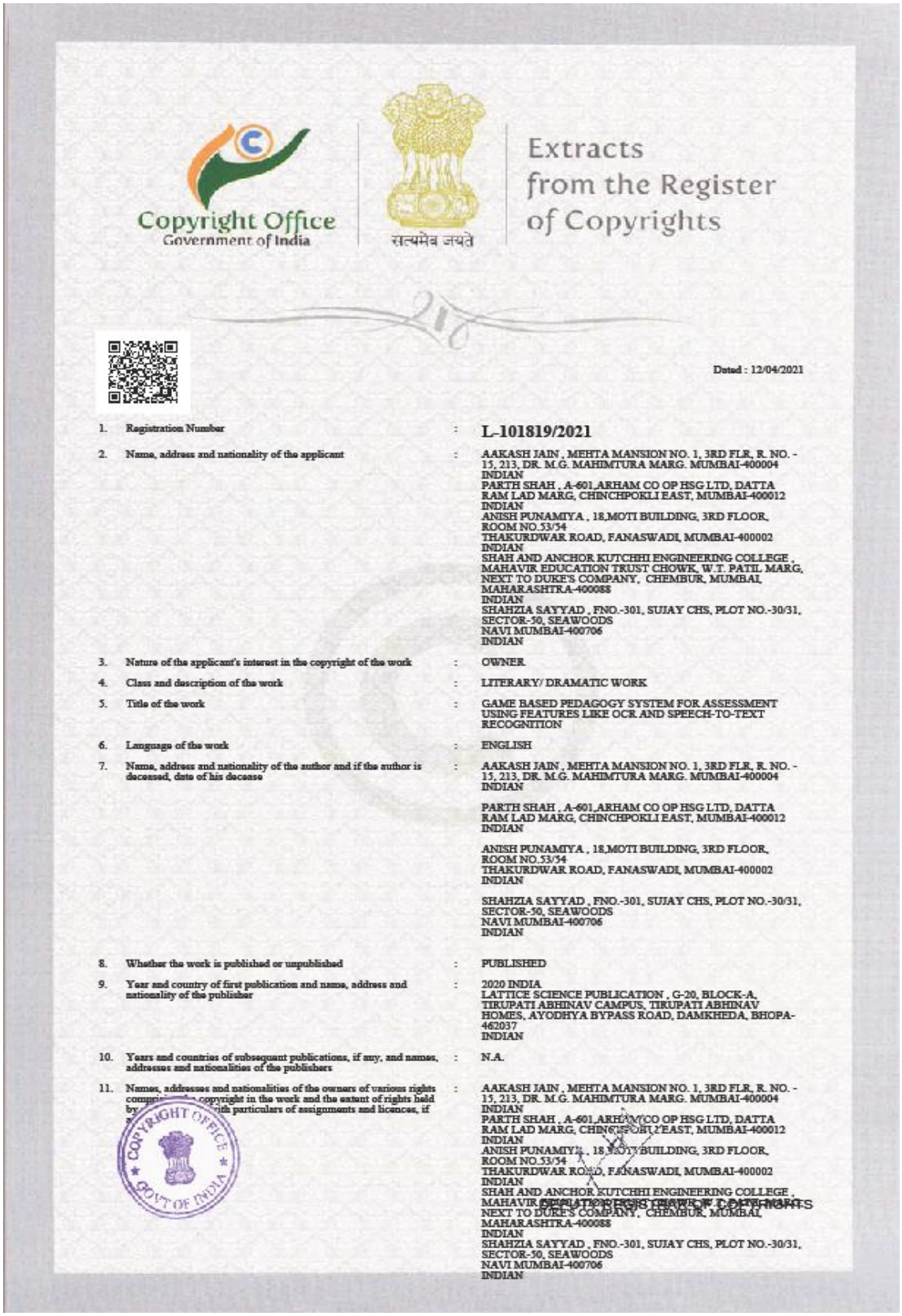

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6.	Language of the work	:	ENGLISH
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New Delhi-110075
Dated :12/04/2021

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FNO.-301, SUJAY CHS, PLOT NO.-30/31, SECTOR-50, SEAWOODSNAVI MUMBAI ,
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Subject : Copyright Registration Certificate - forwarding of.

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