Software Requirements Specification

for

**EXAM CELL AUTOMATION SYSTEM**

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# Introduction

## Purpose

The purpose of the document is to present and document the requirements of the ‘Exam Cell Automation System’. This document will explain the purpose and features of the system, the interfaces of the system, what the system will do and the constraints under which it must operate. The system will streamline and automate various administrative tasks and processes involved in managing the examination and invigilation and computerize the traditional way of conducting exams. This system facilitates a convenient, effective and rapid process for assigning examination halls, updating attendance records, and monitoring instances of academic misconduct.

## Intended Audience and Reading Suggestions

This document is intended to be read by the developers, documentation writers, faculty and the exam cell unit, who are the main stakeholders. The exam cell unit will utilize the system for administering exams. Faculty members will use it to view allotment, update attendance, and report any instances of misconduct during exams. Documentation writers will be responsible for creating user manuals and help files, and can refer to this document to gain a comprehensive understanding of the system's functionality and features.

## Product Scope

The Exam Cell Automation System has been devised with the objective of augmenting the exam management process by providing assistance in a more structured and efficient manner. The system is designed to aid in the administration of exams, thereby facilitating a more methodical and efficacious approach to conducting examinations.

This system enables the Exam Cell to create and configure exam schedules, and to allocate students to different classes in a manner that ensures that students with the same subject are not seated in close proximity to each other, thereby minimizing the risk of academic misconduct. Additionally, the system's seating arrangement optimization feature ensures that space utilization is optimized, which is often difficult to achieve when seating is arranged manually. The system also provides detailed attendance statistics, which enable the Exam Cell to obtain a comprehensive overview of the number of students who attended the exam, as well as the degree of absentees. Moreover, the system is capable of identifying any instances of malpractice that may occur during the exam, allowing the Exam Cell to take appropriate action as needed. The faculty members have the ability to access information regarding class allotment, and are also authorized to report any incidents of academic misconduct that may occur during exams.

## References

* Chaki, P. K., & Anirban, S. (2016). Algorithm for efficient seating plan for centralized exam system. 2016 International Conference on Computational Techniques in Information and Communication Technologies (ICCTICT). doi:10.1109/icctict.2016.7514601

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* <https://nasenjournals.onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-9604.2008.00375.x>

# Overall Description

## Product Perspective

The conventional procedures for seating allocation and exam administration entail a significant amount of effort and time. The methods usually entail utilizing Excel or paper-based approaches to organize student assignments into classes. However, these approaches are time-consuming and can result in errors in seat allocation. Additionally, attendance tracking is handled by a designated faculty member who must physically visit each class to obtain data. Detecting and reporting malpractices during exams is also a time-consuming process, as the invigilator must wait until the conclusion of the exam to notify the exam cell.

The Exam Cell Automation System provides swift and efficient generation of hall allotment data, requiring only a few clicks to allocate students to various classes while ensuring that students with the same exam are not seated together. Invigilators can upload attendance data via the system's website, eliminating the need for additional faculty members to perform this task. Additionally, the system facilitates instant reporting of malpractice incidents during examinations.

By incorporating the exam cell automation system into the examination process, the workload of the exam cell will notably decrease due to the streamlined approach. This system provides a highly effective and efficient means of managing exams, making the entire process more straightforward and manageable

## 2.2 Product Functions

The Exam Cell Automation System can be accessed by two kinds of users – Exam Cell and the faculty members.

The Exam Cell serves as the system administrator and exercises control over user access to the exam automation system. Unique login credentials comprising a username and password are shared with the Exam Cell, facilitating access to the system's functionalities.

Upon successful login to the exam automation system, the Exam Cell can establish the examination schedule, including the dates for conducting the exams, the subjects, and the batches for which they are to be held. The Exam Cell can also select the classes and corresponding seating arrangements for the students. Subsequently, the Exam Cell must upload the student data of each batch, following which the exam seating arrangement is generated. The system ensures that students taking the same exam are not seated in proximity to each other, guaranteeing a fair examination process. The Exam Cell can access the malpractice report through the exam automation system, which offers comprehensive information concerning the student involved and their respective class. They can also access and analyze attendance data for every class. The system provides a range of relevant statistical metrics, which enable the Exam Cell to evaluate the extent of absentees among the students in relation to each year, batch and class.

faculty members, upon logging in, can access the exam seating arrangement information, record attendance data, and report any incidences of malpractice through the exam automation system.

## 2.3 Requirement Survey

The goal of implementing an exam cell automation system is to lessen the workload and enhance the effectiveness of the exam process. The exam cell department provided the requirements, and the head of the department explained the current traditional method of conducting exams that involves manual labor or using Excel spreadsheets, which is a monotonous and time-consuming process.

* In a regular classroom that contains 15 benches, the maximum capacity for students is 45. To guarantee a balanced distribution of students from various batches, a system is implemented where individuals from one batch are assigned odd-numbered columns, while those from another batch are assigned even-numbered columns, considering a class as a matrix of 5 rows and 9 columns.
* However, in the case of a drawing hall, a different allocation approach is implemented. The allocation is based on the branch of study, where each branch is assigned to a separate column and each student is provided with a table and chair. This method ensures that students from the same branch are not grouped together.
* Attendance is taken in each classroom and a person needs to collect all the attendance sheets from all the classrooms and need to sort and set the attendance. The task is extremely arduous and requires a significant amount of time.
* During the time of elective or common subjects , seating arrangements are done differently .
* The present procedure negatively affects the effectiveness of the exam cell seating arrangement system by causing delays in the allocation process, inaccuracies in the seating arrangements, and the necessity for frequent revisions that can be both time-consuming and frustrating for faculty members.
* An automated and efficient exam management system is required to address the concerns of the Exam Cell and alleviate their workload

## 2.4 Operating Environment

Server : Required for hosting our website. Eg : AWS

Operating System Used : Microsoft Windows 11.

Database Management System Used : MongoDB

Programming Languages Used : Html, CSS, JavaScript, Python

## Design and Implementation Constraints

The Exam Cell is responsible for regulating access to the system to ensure data security, ideally with stringent measures in place to prevent any potential breaches.

All the faculty members should have a secure connection to the internet while accessing the features of the system.

If there are any last-minute changes to the class schedule, it may be necessary to re-upload the relevant data to the exam automation system.

## User Documentation

If users require assistance with any aspect of the exam automation system, they can click on the help and support button to access additional guidance. Alternatively, they can contact the system administrator via email or phone for further assistance.

## Assumptions and Dependencies

1. The student data should be uploaded in CSV format.
2. The student data is sorted in ascending order of roll numbers. The login credentials for the admin are pre-determined and confidential.
3. Student information should not include highly sensitive data such as bank account details of Aadhaar numbers.
4. Only the Exam Cell is authorized to manage the exam allotment process.
5. The system meets the necessary hardware specifications.
6. Users should have internet access and basic browsing skills.

# External Interface Requirements

## 3.1 User Interfaces

**3.1.1 Login Screen**

The user first sees this screen of the website. The user has to enter the login credentials to access the system. There are two types of users – admin and faculty.

**3.1.2 Admin landing page**

After login, admin is directed to this page. The admin can choose one among many functionalities provided by the system like add faculty, set exam, cancel exam, allotment, view attendance and malpractice report.

**3.1.3 Faculty landing page**

After login, faculty is directed to this page. The faculty can choose one among many functionalities provided by the system like view allotment, update attendance and report malpractice.

**3.1.4 Set exam page**

Admin can set the details of the exam like date, time, semester and upload the student data. The admin is then taken to the select class page.

**3.1.5 Select class**

The admin has to select the classes where the exam is to be conducted. After this layout of the allotted class is obtained.

**3.1.6. View attendance**

The admin can view the attendance details of students in any selected class.

**3.1.7 View malpractice report**

Admin can analyze the malpractice reports from the classes where the exam is being conducted.

**3.1.8 View allotment**

Faculty can view the allotment details for any selected class.

**3.1.9 Update attendance**

Invigilators can update the attendance of students in their respective classes.

**3.1.10 Report malpractice**

The invigilator can report students who have attempted any kind of malpractice during the examination.

## 3.2 Hardware Interfaces

# Server: As this product is designed to be web-based, it will need a powerful server to host the exam cell automation software.

# Client devices: The exam cell automation system should be accessible from different devices such as laptops, smartphones and desktop computers.

# Scanners and printers: Scanners and printers are needed to create the hard copies of exam allotment, attendance etc.

## 3.3 Software Interfaces

User needs a web browser to interact with the system. It uses Vue.js for frontend implementation and Django framework for backend. The system uses a MongoDB database.

## 3.4 Database Requirements

Database Schema

# 

Database Used : MongoDB

### User Accounts

The database should hold information about the faculty members who can access the database.

### Security

The database should be secure and protected from unauthorized access.

### Scalable

The database should be scalable to accommodate further growth in the number of students, courses, and faculty members.

# 4. System Features

**4.1 Login**

**4.1.1 Description and Priority**

This is to allow Exam Cell and the faculty to login into the Exam Cell Automation System.

**4.1.2 Stimulus/Response Sequences**

* User enters username and password.
* If they are valid and is admin, admin is taken to admin landing page.
* Else, the user is taken to faculty landing page.

**4.1.3 Functional Requirements**

* **Input**: Enter Username and password
* **Output**: If both the inputs are valid and it's an admin , then the landing page of admin opens up. If both the inputs are valid and it’s a faculty, then the landing page of the faculty opens up.
* **Error Condition**: In case of invalid username or password, login fails and asks the user to re-enter the login form detail again.

## Landing page of admin

### Description and Priority

This page lists out the functionalities that the admin can access including add faculty, set and cancel exam, allotment , view attendance and malpractice reports.

### Stimulus/Response Sequences

* Admin logs in the website.
* Click on one among the 6 buttons available in the page.
* Based on the functionality selected they will be directed to different pages.

### Functional Requirements

**Input**: Click on any button among the seven buttons available in the page

**Output**: The system takes the admin to a unique page to collect or provide more details on the functionality selected.

## Landing page of faculty

**4.2.1 Description and Priority**

This page lists out the functionalities that the faculty can access including view allotment, update attendance and report malpractice.

**4.2.2 Stimulus/Response Sequences**

• Faculty logs in the website.

• Click on one among the 3 buttons available in the page.

• Based on the functionality selected they will be directed to different pages.

**4.2.3 Functional Requirements**

**Input**: Click on any button among the three buttons available in the page

**Output**: The system takes the admin to a unique page to collect or provide more details on the functionality selected.

## Add faculty

### Description and Priority

This page is for controlling the access to the software, which is a functionality provided to ensure security of the system.

### Stimulus/Response Sequences

* Admin on clicking the add faculty button is directed to this page.
* Admin adds the details of the faculty who can access the system.
* Click the submit button.

**4.2.3 Functional Requirements**

**Input**: Add the name and password of the faculty to be added and press submit button.

**Output**: The system displays the details of the faculty added

## Set exam

## 4.5.1 Description and Priority

This page is used for setting the timetable or the exam dates based on the given branch, exam type, exam timing and semester.

**4.5.2 Stimulus/Response Sequences**

* Admin on clicking the set exam button is directed to this page.
* Admin can add the details of the exam to be conducted
* Click the submit button.

**4.5.3 Functional Requirements**

**Input**: Select the dates and allot the exam schedule based on the branch, semester, type and press submit button.

**Output**: The system displays the details of the exam schedule.

## Allotment

### Description and Priority

This page is for allotting the classes for conducting examinations.

### Stimulus/Response Sequences

* Admin on clicking the allotment button is directed to this page.
* Admin can choose branch, year and choose the classes where the exam has to be conducted.
* Click the submit button.

### Functional Requirements

#### Choose\_Branch

**Input**: Select the branches for which exam is to be conducted

**Output**: The branch will be selected and is directed to choose\_sem page.

#### Choose\_Sem

**Input:** Select the semesters for which exam is to be conducted

**Output:** The semesters will be selected and are directed to select\_class page.

#### Select\_class

**Input**: Select the classes where exam is to be conducted

**Output**: The classes will be selected and class allotment is generated. The admin is directed to the layout page.

#### Layout

**Input**: Select the class for which seating arrangement has to be viewed.

**Output**: Layout of corresponding class will be displayed.

## Attendance

### Description and Priority

This page is for viewing the attendance of students .

### Stimulus/Response Sequences

* Admin on clicking the attendance button in the landing page is directed to this page.
* Admin can choose a class and then press the submit button.

**4.7.3 Functional Requirements**

**Input**: Select the class and press submit button.

**Output**: The system displays the details of the class attendance.

## Malpractice report

**4.8.1 Description and Priority**

This page is for checking the malpractice report from the exam halls .

**4.8.2 Stimulus/Response Sequences**

Admin on clicking the Malpractice report button in the landing page is directed to this page.

**4.8.3 Functional Requirements**

Input: No inputs required.

Output: The system displays the details of the malpractice occurred in corresponding classes.

## Cancel Exam

**4.9.1 Description and Priority**

This page is for canceling the exam.

**4.9.2 Stimulus/Response Sequences**

Admin on clicking the cancel button in the landing page is directed to this page.

**4.9.3 Functional Requirements**

**Input**: No inputs required.

**Output**: The system clears the exam allotment data.

## View Allotment

**4.10.1 Description and Priority**

This page is for the faculty to view the exam hall allotment.

**4.10.2 Stimulus/Response Sequences**

* Faculty on clicking the view allotment button in the landing page is directed to this page.
* Select the class.
* Press the Submit button.

**4.10.3 Functional Requirements**

**Input**: Select the class whose layout has to be viewed.

**Output**: The layout of the specified class is displayed.

## Update Attendance

**4.11.1 Description and Priority**

This page is for the invigilator in each class to update the attendance of students attending the exam.

**4.11.2 Stimulus/Response Sequences**

* Faculty on selecting the Update Attendance button in the landing page is directed to this page.
* Select the class.
* Update the attendance of the students present in the class.

**4.11.3 Functional Requirements**

**Input**: Select the class whose attendance has to be updated and mark the attendance.

**Output**: The updated attendance sheet is displayed.

## Report malpractice

### Description and Priority

This page is for the invigilators to report any incidences of malpractice in the exam hall.

### Stimulus/Response Sequences

* Faculty on selecting the Report Malpractice button in the landing page is directed to this page.
* Select the class.
* Enter the details of the student (class, branch, roll number) and any other required comments.
* Press the Submit button.

**4.11.3 Functional Requirements**

**Input**: Select the class and enter the details of the students who have committed the malpractice.

**Output**: The student data uploaded is displayed.

# Other Nonfunctional Requirements

## 5.1 Performance Requirements

The website would be functional for 24 hours a day to enable user interaction at any point of time.

## Security Requirements

1. **Authentication**: The Exam Cell is responsible for managing user access to the Exam Cell Automation system. Once admitted by the Exam Cell, faculty members are authorized to use the system. The Exam Cell possesses the capability to retrieve and inspect the login information of faculty members, which allows them to monitor and manage access to the Exam Cell Automation system. The Exam Cell Automation system implements a secure login process for the admin by requiring them to enter a One-Time Password (OTP) that is sent to their email address
2. **Authorization**: The Exam Cell has exclusive authority to schedule exams, assign classrooms, and view reports on attendance and instances of malpractice within the Exam Cell Automation system. On the other hand, faculty members are not granted access to these functionalities, as they are only authorized to report malpractice incidents, update attendance records, and view classroom assignments.
3. **Encryption**: The admin can enter only after typing the otp that is sent via email.
4. **Data Backup and recovery**: System implements a regular backup schedule. The backup data is stored in cloud storage service , Amazon S3.

## Maintainability

The Exam Cell Automation System employs a commercial database for persistent storage of its data, and the web application is hosted by an application server. In the event of a system failure, the program is reinitialized to its original state, thereby allowing the system to recover from any errors that may have occurred.

The system has been designed with a modular architecture to ensure that changes to the system can be made with ease and without adversely affecting the overall performance.

## Software Quality Attributes

# Adaptability: New changes can be easily accommodated.

# Availability: This website would be functional for 24\*7 .

# Flexibility: Provides highly flexible service to the user. The admin can select any class with the given layout and any number of batches for conducting the exams.

# Portability: Not dependent on a particular OS.

# Deployment For Use.

This refers to the usage of the final app by the stakeholders or the end-users.The website before deployment is tested virtually over some platform and each test cases are verified since for a successful deployment of the website/application requires careful planning,strategy,testing and collaboration between developers.Hence the required functionality of the stakeholders is satisfied through the end product by also complying within the estimated budget and allotted time duration.