Smart Time-Table & Substitution Manager

1. Overview

The Smart Time-Table & Substitution Manager aims to streamline class schedule management, faculty substitutions, class cancellations, and announcements of special classes. This ensures students and faculty have real-time visibility and academic continuity.

2. Objective

To build a web-based CRUD system that allows:

- Admins to manage class schedules and faculty availability.
- Faculty to view and update their schedules (e.g., mark unavailable days).
- Students to access real-time time-table updates including substitutions and cancellations.

3. Target Users

- **Admin/Coordinator**: Manages master schedules, updates substitutions, cancels/reschedules classes.
- **Faculty**: Views and updates availability.
- **Students**: Views real-time timetable updates.

4. Functional Requirements

🟢 Create

- Admin can:
    - Add new class schedules.
    - Input faculty availability.
    - Assign faculty to classes.

🔵 Read

- Faculty/Students can:
    - View the current day's timetable.
    - Check future class schedules.

🟠 Update

- Admin can:
    - Mark a class as cancelled.
    - Assign a substitute faculty.
    - Schedule special classes.

🔴 Delete

- Admin can:
    - Delete outdated schedules.
    - Remove duplicate or erroneous entries.

5. Tech Stack (MERN)

- **MongoDB**: Stores schedules, user roles, class info, and updates.
- **Express.js**: Backend API server.
- **React.js**: Frontend interface for students, faculty, and admin.
- **Node.js**: Runs the backend logic.

6. System Architecture

7. Database Schema (MongoDB)

User

```
{
  "name": "Dr. Smith",
  "email": "smith@college.edu",
  "role": "faculty", // or "student", "admin"
  "availability": ["Monday", "Wednesday"]
}
```

Schedule

```
{
  "date": "2025-05-21",
  "class": "CS301",
  "time": "10:00 - 11:00",
  "faculty": "Dr. Smith",
  "room": "B201",
  "status": "active", // cancelled, substituted, special
```

"substituteFaculty": "Dr. John" // optional

}

8. User Interfaces

a. Admin Dashboard

- Add/Edit/Delete schedules
- Assign substitutes
- Broadcast special class info

b. Faculty Panel

- View personal schedule
- Update availability
- Accept substitution requests

c. Student View

- Real-time view of daily schedule
- Notifications for cancellations/special classes

9. Non-Functional Requirements

- **Authentication**: JWT-based role management.
- **Responsive UI**: Mobile and desktop compatibility.
- **Notification System**: Real-time updates using WebSockets or polling.
- **Audit Logging**: Changes in schedules should be logged.

10. Impact

✅ Reduces miscommunication

✅ Ensures academic continuity

✅ Enhances institutional productivity