



# **Indian Institute of Technology Hyderabad (IIT)**

## **Test Plan for MASS (Medical Access Service System)**

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# **1. UNIT TESTING**

## **1.1 Modules Requiring Unit Testing:**

### **1.1.1. Hospital Signup**

- Verify all fields are validated.
- Ensure registration document is required.
- Check email and phone format validation.

### **1.1.2. Hospital Login**

- Validate hashed password check.
- Token generation on successful login.

### **1.1.3. Patient Signup**

- Validate all fields.
- Email and phone number formats validated.

### **1.1.4. Patient Login**

- Validate hashed password check.
- Token generation on successful login.

### **1.1.5. Doctor Signup**

- Check linkage to hospital ID.
- Validate credentials and inputs.

### **1.1.6. Doctor Login**

- Token generation.
- Password hashing check.

#### **1.1.7. Hospital Verification (System Controlled)**

- Ensure only valid documents trigger verification.
- Invalid hospitals are blocked from login.

#### **1.1.8. Doctor Verification (Hospital Admin Controlled)**

- Only hospital admins can verify.
- Verified flag updates correctly.

#### **1.1.9. Appointment Creation (By Patient)**

- Time slot, date, doctor ID validation.
- Prevent double-booking.

#### **1.1.10. Appointment Confirmation (By Hospital Admin)**

- Status update check.
- Sync with Google Calendar. {could n't implement due to google services issues}

#### **1.1.11. Notification (System Generated)**

- Validate email/notification is sent to all actors:
  - Patient (appointment status)
  - Doctor (new appointment)
  - Hospital (admin notification)

### **1.1.12. Google Calendar Integration { google services limited OAuth}**

- Check token authentication with Google API.
- Confirm events are created correctly with title, date, time, participants.
- 

// Email notification instead of google calendar

### **1.1.13. Get Appointment List (All Actors)**

- Patient: Only their appointments.
- Doctor: Only confirmed ones assigned to them.
- Hospital Admin: All appointments under hospital.

### **1.1.14. Get Hospital List (For Patient View)**

- Ensure only verified hospitals are listed.
- Accurate display of hospital details.

### **1.1.15. Password Hashing (All Actors)**

- Validate hashing with bcrypt or equivalent.
- No plaintext passwords stored.

### **1.1.16. Token Generation (All Actors)**

- On login, verify JWT or session tokens.
- Token expiry time set and respected.

### **1.1.17. Email & Phone Validation (All Actors)**

- Regex validation during signup.

- Error handling for invalid input.

### 1.1.18. Change/Reset Password

- OTP/email verification before reset.
- New password is hashed before saving.
- 

## 1.2 7 Detailed Unit Tests (2 Input, 2 Output, 3 Transform)

### 1.2.1 Authentication & Authorization (Input Module)

| Seq No | Condition to be tested                                      | Test Data                     | Expected Result                             |
|--------|---|-------------------------------|---|
| 1      | Hospital signup with missing registration document          | Valid fields, missing file    | Error message prompting for document upload |
| 2      | Hospital signup with invalid email/phone                    | Invalid email/phone format    | Error message for invalid input             |
| 3      | Successful hospital signup                                  | All valid inputs              | Signup success, verification pending        |
| 4      | Login attempt with wrong password (hospital/doctor/patient) | Correct email, wrong password | Error message                               |
| 5      | Successful login (hospital/doctor/patient)                  | Correct credentials           | Token generated, login success              |
| 6      | Doctor signup with invalid hospital ID                      | Non-existent hospital ID      | Error message                               |
| 7      | Verification attempt by unauthorized user                   | Non-admin tries verification  | Access denied error                         |

|    |   |                             |                                       |
|----|---|-----------------------------|---------------------------------------|
| 8  | Doctor verification by hospital admin         | Verified credentials        | Verified flag set to true             |
| 9  | Password change with mismatched new passwords | Mismatched inputs           | Error message prompting correct match |
| 10 | Reset password with valid OTP/email           | Verified email, correct OTP | New password hashed and updated       |

### 1.2.2 Appointment Booking (Transform Module)

| Seq No | Condition to be tested                            | Test Data                    | Expected Result                                |
|--------|---|------------------------------|--|
| 1      | Book appointment with already taken slot          | Same doctor, date, time slot | Error: slot unavailable                        |
| 2      | Book appointment with all valid fields            | Valid doctor ID, slot, date  | Appointment created, confirmation pending      |
| 3      | Confirm appointment by hospital admin             | Appointment ID               | Status updated, calendar synced                |
| 4      | Appointment created without selecting doctor/date | Missing doctor ID or date    | Error message prompting to complete all fields |

### 1.2.3 Notification System (Output Module)

| Seq No | Condition to be tested                                    | Test Data             | Expected Result                    |
|--------|---|-----------------------|------------------------------------|
| 1      | Patient receives notification on appointment confirmation | Appointment confirmed | Email/notification sent to patient |



|   |   |                         |                                   |
|---|---|-------------------------|-----------------------------------|
| 2 | Doctor receives notification for new appointment      | New appointment created | Email/notification sent to doctor |
| 3 | Hospital admin receives notification for verification | New doctor signup       | Admin receives notification       |

//google calendar module not present

#### 1.2.4 Google Calendar Integration (Transform Module)

| Seq No | Condition to be tested                        | Test Data                       | Expected Result                                    |
|--------|---|---------------------------------|--|
| 1      | Sync confirmed appointment to Google Calendar | Valid appointment, Google token | Event created with title, participants, date, time |
| 2      | Calendar sync fails due to invalid token      | Expired/invalid Google token    | Error message prompting re-authentication          |

#### 1.2.5 Security Validation (Input Module)

| Seq No | Condition to be tested                   | Test Data                | Expected Result                                |
|--------|--|--------------------------|--|
| 1      | Hashing passwords during signup/reset    | New password             | No plaintext stored, hash created using bcrypt |
| 2      | Token generated on login                 | Valid login              | JWT/session token returned with expiry         |
| 3      | Invalid token access to protected routes | Expired or invalid token | Access denied, redirect or error message       |

### 1.2.6 Field Validation (Input Module)

| Seq No | Condition to be tested                   | Test Data  | Expected Result               |
|--------|--|------------|-------------------------------|
| 1      | Enter invalid email format during signup | abc@@gmail | Error: Invalid email format   |
| 2      | Enter short password                     | pwd123     | Error: Minimum length not met |
| 3      | Phone number with letters                | 98a23b     | Error: Invalid phone number   |

## 2. INTEGRATION TESTING

### 2.1 Module Interactions Needing Integration Testing:

- Hospital Signup → Hospital Verification
- Doctor Signup → Doctor Verification
- Patient Signup → Appointment Creation
- Appointment Creation → Appointment Confirmation
- Appointment Confirmation → Google Calendar Integration
- Login (all actors) → Token Generation
- Reset Password → Email Validation
- Appointment Creation → Notification System

## 2.2 5 Detailed Integration Tests (Input-Input, Input-Transform, etc.)

| Seq No | Condition to be tested                     | Test Data  | Expected Result                                |
|--------|--|--|--|
| 1      | Hospital Signup → Hospital Verification    | Hospital details, registration doc                 | Account moves to verified state                |
| 2      | Doctor Signup → Doctor Verification        | Doctor details, Hospital admin approval            | Doctor status changed to verified              |
| 3      | Appointment Creation → Confirmation        | Patient selects date/time, hospital admin confirms | Appointment status: confirmed                  |
| 4      | Appointment Confirmation → Google Calendar | Confirmed appointment                              | Event added to calendar {removed this feature} |
| 5      | Appointment Creation → Notification        | Patient creates appointment                        | Notification sent to hospital admin & doctor   |

### Observations:

- Input-input interactions like signup → verification are more prone to user errors.
- Transform-transform interactions like confirmation → calendar integration require robust data consistency.
- Output-output (like notification → calendar update) require careful async handling.

### Design Document Correlation:

- All 5 interactions are represented in the sequence and activity diagrams of the design document.

## 3. SYSTEM TESTING

### 3.1 Use Cases Selected for System Testing:

- Hospital Registration and Verification
- Patient Signup and Login
- Doctor Registration and Hospital Approval
- Appointment Booking by Patient
- Appointment Confirmation by Hospital Admin
- Notification Handling (to doctor, patient, hospital)
- Google Calendar Integration // removed this
- Password Reset

### 3.2 Detailed Test Case Specifications:

| Seq No | Condition to be tested                | Test Data                               | Expected Result                    |
|--------|---------------------------------------|---|------------------------------------|
| 1      | Hospital signup + system verification | Hospital details                        | Verified hospital added            |
| 2      | Patient signup and login              | Valid patient details                   | User dashboard visible after login |
| 3      | Doctor signup + hospital approval     | Doctor details, hospital admin approval | Doctor becomes verified            |
| 4      | Patient books appointment             | Selects slot, doctor, hospital          | Appointment pending status         |
| 5      | Hospital admin confirms appointment   | Appointment ID                          | Status = confirmed                 |
| 6      | System sends notification             | Confirmed appointment                   | Patient, doctor, admin notified    |

|   |                          |                          |   |
|---|--------------------------|--------------------------|---|
| 7 | Google Calendar sync     | Confirmed appointment    | Event appears in calendars {not available } |
| 8 | Reset password via email | Email, OTP, new password | Password successfully reset                 |

### 3.3 Test Case Generation Methods Used:

| Seq No | Use Case                 | Test Data           | Expected Result                 | Testing Method     |
|--------|--------------------------|---------------------|---------------------------------|--------------------|
| 1      | Patient signup           | Valid inputs        | Success                         | Equivalence class  |
| 2      | Doctor login             | Invalid credentials | Error                           | Error guessing     |
| 3      | Create appointment       | Missing time        | Error                           | Boundary value     |
| 4      | Double booking           | Same time/doctor    | Blocked                         | Cause-effect graph |
| 5      | Appointment confirmation | Valid flow          | Status updated + calendar event | Pair-wise          |
|        |                          |                     |                                 |                    |

|   |                    |                    |                |              |
|---|--------------------|--------------------|----------------|--------------|
| 7 | Password reset     | Wrong OTP          | Fail           | Special case |
| 8 | Email notification | New<br>appointment | Sent to doctor | State-based  |