

Testing

1. Introduction

Testing is a critical phase in the software development lifecycle that ensures the system meets its intended requirements and functions correctly under various conditions. For UTMS, testing focused on verifying both the student and admin interfaces, database operations, and API endpoints. Functional testing, unit testing, and integration testing were performed using manual and automated tools to validate system reliability and user experience.

2. Testing Types and Methods

2.1. Unit Testing

Each module (e.g., login, challan upload, registration) was tested independently to ensure it worked as expected. Unit tests were written using basic function simulations and tested via browser DevTools and Postman for backend APIs.

2.2. Integration Testing

Integration testing was conducted to verify that multiple components—like frontend forms and backend APIs—interacted correctly. For example, the challan submission module was tested from student UI to database storage.

2.3. Functional Testing

The system was tested for all defined use cases such as student registration, admin login, challan verification, route updates, and notifications.

2.4. User Acceptance Testing (UAT)

UAT was conducted with mock student accounts and dummy challan data to simulate real-world usage. Admins also performed testing from their respective dashboards.

3. Test Cases Overview

Test Case ID	Feature	Description	Expected Result	Status
TC-001	Student Login	Valid credentials input	Redirect to homepage	Pass
TC-002	Student Login	Invalid credentials	Error: "Invalid username or password"	Pass
TC-003	Registration	Valid signup request	Confirmation email sent	Pass

TC-004	Registration	Incomplete or invalid data	Rejected with error	Pass
TC-005	Challan Generation	Challan creation and download in PDF	File successfully downloaded	Pass
TC-006	Challan Verification	Admin verifies submitted challan	Status changes to "Approved"	Pass
TC-007	Notifications	Admin sends a message	Student receives email & in-app alert	Pass
TC-008	Schedule Update	Admin updates transport schedule	Student dashboard reflects changes	Pass
TC-009	Profile Management	Student updates profile photo/details	Changes saved and viewable	Pass

4. Testing Tools Used

- Postman – For API testing (CRUD operations and authentication)
- MongoDB Compass – For verifying database records
- Browser DevTools – For frontend behavior testing and form validation
- Console Logs – For debugging issues and flow tracking
- Visual Studio Code Debugger – For backend logic validation

5. Bug Tracking and Fixes

Bugs were tracked manually using a shared document, and each was resolved before final deployment. Common issues included:

- Unhandled empty form submissions – Fixed with frontend validations.
- Incorrect challan file formats – Implemented file type restrictions.
- Routes scheduling conflicts – Resolved through time-slot checks.

6. Final Testing Outcome

After comprehensive testing of all modules, the UTMS system was marked as stable for deployment. All major features passed their respective test cases, and no critical issues remained.

UTMS has successfully passed the functional, integration, and user acceptance tests and is ready for real-world use within the university environment.