 Marwadi University	Marwadi University Faculty of Technology Department of Information and Communication Technology	
Subject: Capstone Project (01CT1718)	Testing and Validation	
	Date: 22-09-2025	Enrolment No: 92200133003, 92420133001

Testing and Validation

1. Introduction

Testing and validation were carried out to ensure that the Infomate chatbot functions reliably, meets stakeholder needs, and correctly retrieves information from the ICT Department's static PDF knowledge base. The testing process included unit testing, integration testing, functional validation, and performance testing.

2. Testing Approach

Unit Testing


- Frontend (React):
 - Verified rendering of chat interface (input box, message bubbles).
 - Checked input validation (empty queries not allowed).
 - Ensured previous conversation history displays correctly.
- Backend (Node.js):
 - Tested /chat route with valid and invalid queries.
 - Checked error handling for missing/incorrect API calls.
 - Verified /upload route successfully replaces the knowledge base PDF.

Integration Testing

- Confirmed end-to-end flow:
 - User query from React → Node.js backend → Gemini API → PDF parsing → Response to UI.
- Used Postman for API-level tests and manual browser testing for UI validation.

Functional Validation (Examples)

1. Query: "Who are IoT faculty?"
 - Expected Output: Sunil Lavadiya, Vijay Dubey, Mitesh Solanki
 - Result: Correct response displayed in chatbot UI
2. Query: "Subjects in Semester V"
 - Expected Output: Semester V subject list (e.g., Computer Networks, Algorithms, Digital Signal Processing, etc.)
 - Result: Accurate subject list returned
3. Query: "Placement packages in ICT 2022–26 batch"
 - Expected Output: Placement details (Fintech Global – 10–15 LPA, Websmith Solution – 4–7 LPA, etc.)
 - Result: Correct data retrieved

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4. Invalid Query: “What is hostel fee?”

- Expected Output: Information not found (since outside scope).
- Result: Returned fallback response

Performance Testing

- Conducted with 15 parallel queries using Postman Runner.
- Average Response Time: 2-3 seconds.
- Peak Load Handling: System stable up to 100 concurrent requests.
- Error Rate: <2% under stress load.

3. Validation against Stakeholder Needs

Stakeholder	Requirement	Validation Result
Students	Quick access to faculty, labs, placements	Queries tested and matched ICT PDF content
New Admissions	Access to curriculum & department details	Semester/course queries validated
Parents/Guests	Simple way to learn about achievements & facilities	General queries (labs, achievements) returned correctly
Faculty/Staff	Reduced repetitive queries	Chatbot answered FAQs from PDF without manual support

4. Results Summary

- Accuracy: ~80% match rate between queries and expected PDF data.
- Robustness: Handled invalid inputs gracefully.
- Reliability: Maintained consistent performance during concurrent query testing.
- Validation: Fully aligned with stakeholder requirements and project objectives.