iJRASET
International Journal For Research in Applied Science and Engineering Technology



# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

**Volume:** 14 **Issue:** I **Month of publication:** January 2026

**DOI:** https://doi.org/10.22214/ijraset.2026.76748

www.ijraset.com

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538*
*Volume 14 Issue I Jan 2026- Available at www.ijraset.com*

# API Testing Using Postman: A Practical Approach for Ensuring Software Quality

Miss. Prajakta Prakash Joshi
*Assistant Professor, Dept. of BCA, MCCCS Nigdi, Pune, Maharashtra, India*

***Abstract:*** ***Application Programming Interfaces (APIs) have become the backbone of modern software applications, enabling communication between heterogeneous systems such as web, mobile, and cloud-based applications. As APIs play a critical role in data exchange, their correctness, reliability, and performance are essential for overall software quality. This research paper presents a practical study of API testing using the Postman tool. The paper explains the fundamentals of API testing, different HTTP methods, and testing techniques applied using Postman. A real-time case study is conducted on a RESTful API to demonstrate request execution, response validation, and automation capabilities. The study highlights the effectiveness of Postman in detecting defects early, reducing manual testing effort, and supporting Agile and DevOps practices. The results show that Postman is a cost-effective and user-friendly tool for ensuring API quality in modern software development.***
***Keywords: API Testing, Postman, REST API, Software Testing, Automation Testing, Web Services***

## I. INTRODUCTION

In recent years, software applications have evolved from monolithic architectures to distributed systems based on web services and microservices. APIs act as an interface that allows different software components to communicate with each other. Any failure in API functionality may directly impact application performance and user experience.

Traditional GUI-based testing is not sufficient for validating backend services. Hence, API testing has become an essential part of the software testing life cycle. API testing focuses on verifying the business logic, data accuracy, security, and performance of APIs. This paper focuses on Postman, a widely used API testing tool, and demonstrates its practical use for testing RESTful APIs.

## II. LITERATURE REVIEW

Several studies highlight the importance of API testing in modern software systems. Sommerville emphasized that early testing of interfaces reduces defect cost significantly. Researchers have discussed various API testing tools such as SoapUI, JMeter, and Rest Assured. However, these tools often require complex setup or programming knowledge.

Recent studies indicate that Postman provides an easy-to-use graphical interface, scripting support, and automation capabilities, making it suitable for both beginners and professionals. Existing literature mainly focuses on automation frameworks, but limited work explains Postman with a detailed practical case study. This research attempts to bridge that gap.

## III. OVERVIEW OF API TESTING

API testing is a type of software testing that validates APIs directly and determines whether they meet expectations for functionality, reliability, performance, and security.

*1) Types of API Testing*

- Functional Testing
- Load and Performance Testing
- Security Testing
- Reliability Testing
- Regression Testing

*2) HTTP Methods Used in API Testing*

- GET – Retrieve data
- POST – Create new data
- PUT – Update existing data
- DELETE – Remove data

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*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538*
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## IV. POSTMAN TOOL OVERVIEW

Postman is a popular API development and testing tool used to send HTTP requests and analyze responses.

*1) Features of Postman*

- User-friendly GUI
- Support for REST APIs
- Environment variables
- Automated testing using JavaScript

*2) Architecture of Postman*

Postman follows a client-based architecture where requests are sent to the API server and responses are analyzed based on status codes, headers, and body.

## V. METHODLOGY

The methodology adopted in this research involves practical API testing using Postman on a publicly available REST API.

*1) Test Environment*

- Tool: Postman
- API: Public REST API (JSON Placeholder / ReqRes)
- Platform: Windows
- Testing Type: Functional API Testing

*2) Test Scenarios*

- Validate GET request response
- Verify POST request data creation
- Update resource using PUT
- Delete resource using DELETE
- Validate response status codes
- Validate response time and data format

## VI. CASE STUDY: API TESTING USING POSTMAN

*1) GET Request*

- Objective: Retrieve user details
- Expected Result: Status code 200, correct JSON response

*2) POST Request*

- Objective: Create new user
- Expected Result: Status code 201, user created successfully

*3) PUT Request*

- Objective: Update user details
- Expected Result: Status code 200, updated data

*4) DELETE Request*

- Objective: Delete user
- Expected Result: Status code 204

*5) Automated Validation*

Postman test scripts are used to validate:

- Status codes
- Response time
- JSON schema
- Field values

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## VII. RESULT AND DISCUSSION

The experimental results indicate that Postman significantly reduces testing time compared to manual testing. Defects related to incorrect responses, missing fields, and invalid status codes were easily identified. Automation using collections improved test repeatability and reliability.

| Parameter | Manual Testing | Postman API Testing |
|---|---|---|
| Time Required | High | Low |
| Accuracy | Medium | High |
| Automation | No | Yes |
| Learning Curve | Medium | Easy |

## VIII. ADVANTAGES AND LIMITATIONS

*1) Advantages*

- Easy to learn and use
- Supports automation
- Suitable for Agile and DevOps
- No coding required for basic testing

*2) Limitations*

- Limited performance testing features
- Advanced automation requires scripting knowledge

## IX. CONCLUSION

API testing plays a crucial role in ensuring software quality. This research demonstrates that Postman is an effective tool for testing RESTful APIs with minimal effort. The practical case study confirms that Postman improves test efficiency, accuracy, and defect detection. It is suitable for academic, industrial, and training purposes.

## X. FUTURE SCOPE

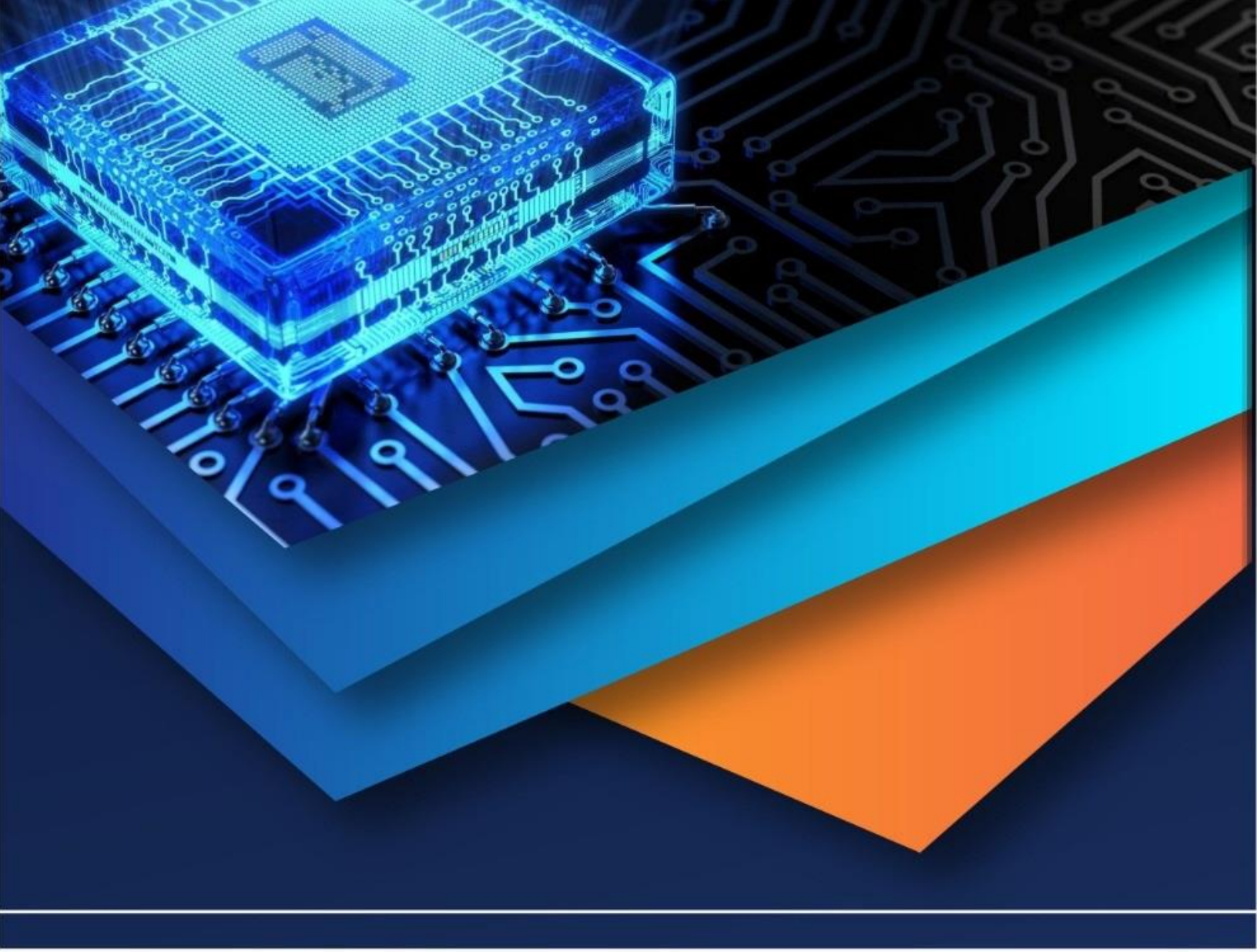
Future work may include:

- Integration of Postman with CI/CD pipelines
- Security testing using OWASP API guidelines
- Performance testing integration
- AI-based API testing techniques

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