

## **2.3 Requirements Traceability Matrix**

### **2.3.1 Functional Requirements**

#### **FR-1: User Registration**

The system shall allow users (Admin, Member, Inventory Manager, Customer) to create an account by providing required information such as name, email/phone, username, password, confirm password, and user role.

#### **FR-2: User Login**

The system shall allow registered users to log in using a valid username and password based on their assigned role.

#### **FR-3: Role-Based Access Control**

The system shall restrict system features and dashboards according to the authenticated user's role.

#### **FR-4: Password Security**

The system shall mask passwords during input and enforce password complexity rules during registration and password reset.

#### **FR-5: Forgot Password**

The system shall allow users to reset their password using an OTP or reset link sent to their registered email or phone number.

#### **FR-6: OTP Validation**

The system shall validate OTPs and reject expired or incorrect OTPs during password reset.

#### **FR-7: Product Browsing**

The system shall allow customers to view available products with details including name, price, stock quantity, and image.

#### **FR-8: Search and Filter Products**

The system shall allow users to search and filter products by name or category.

#### **FR-9: Cart Management**

The system shall allow customers to add products to the cart, update quantities, and remove items with real-time price calculation.

**FR-10: Stock Validation**

The system shall prevent customers from adding quantities greater than available stock.

**FR-11: Checkout Process**

The system shall require customers to provide mandatory checkout information such as name, phone number, and delivery address.

**FR-12: Payment Processing**

The system shall support payment options and validate payment details before confirming a purchase.

**FR-13: Order Confirmation**

The system shall generate an order confirmation and invoice after successful payment.

**FR-14: Sales Report Generation**

The system shall allow admins to generate sales reports with date filters and summaries.

**FR-15: Sales Data Export**

The system shall allow admins to export sales reports in PDF or Excel format.

**FR-16: Sales Analytics**

The system shall calculate and display total revenue, total transactions, and top-selling products.

**FR-17: Invoice Viewing**

The system shall allow admins to view individual invoices for completed sales.

**FR-18: Validation and Error Handling**

The system shall display clear validation and error messages for invalid inputs without refreshing the page.

**FR-19: Session Management**

The system shall maintain secure user sessions and allow users to log out successfully.

**FR-20: Access Restriction**

The system shall prevent unauthorized users from accessing protected features and pages.

## 2.3.2 Non-Functional Requirements

### NFR-1: Performance

The system shall respond to user actions (page load, product search, checkout) within **3 seconds** under normal operating conditions.

### NFR-2: Transaction Speed

The system shall complete payment processing and order confirmation within **5 seconds** after submission.

### NFR-3: Concurrent Users

The system shall support at least **50 concurrent users** without performance degradation.

### NFR-4: Reliability & Availability

The system shall be available **99% of the time**, excluding scheduled maintenance.

### NFR-5: Fault Tolerance

In the event of a minor system failure, the system shall **recover automatically without data loss**.

### NFR-6: Data Backup

All sales, customer, and inventory data shall be **backed up daily** to prevent loss.

### NFR-7: Usability

The system shall be **easy to use**, allowing users with basic computer skills to navigate and complete tasks without prior training.

### NFR-8: Interface Consistency

All pages, forms, and messages shall maintain a **uniform and intuitive design**.

### NFR-9: Accessibility

The system shall be compliant with **accessibility guidelines** to accommodate users with disabilities.

### NFR-10: Security

All sensitive data, including passwords and payment information, shall be **encrypted**, and the system shall prevent unauthorized access.

### NFR-11: Session Management

User sessions shall **expire after 15 minutes** of inactivity to ensure security.

### NFR-12: Input Validation

All inputs shall be validated to prevent **SQL injection, XSS attacks, and other malicious entries**.

**NFR-13: Maintainability**

The system shall be developed using **modular, reusable code** to allow easy updates and bug fixes.

**NFR-14: Documentation**

Technical documentation shall be provided for all modules, including **database schema, APIs, and system workflows**.

**NFR-15: Scalability**

The system shall be designed to **handle future growth**, including increased users, products, and sales data.