

A Project Report On

**TWISTELA**

Submitted in partial fulfillment of the requirement for  
the award of the degree

Master of Computer Applications  
(MCA)

Academic Year 2025 – 26

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**Internal Guide**

Prof. Jaypalsinh Gohil



**Marwadi**  
University  
Marwadi Chandarana Group





**Marwadi**  
University  
Marwadi Chandarana Group



## Faculty of Computer Applications (FoCA)

# Certificate

This is to certify that the project work entitled  
**Twistela**  
submitted in partial fulfillment of the requirement  
for  
the award of the degree of  
Master of Computer Applications (MCA)  
of the  
Marwadi University  
is a result of the bonafide work carried out by  
**Astha Dadhaniya -92400584069**  
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**Krishna Shah -92400584182**  
during the academic year 2025-26

A handwritten signature in blue ink.

**Faculty Guide**

A handwritten signature in blue ink.

**HOD**

A handwritten signature in blue ink.

**Dean**

## **DECLARATION**

We hereby declare that this project work entitled Twistela is a record done by us.

We also declare that the matter embodied in this project is genuine work done by us and has not been submitted whether to Marwadi University or to any other University / Institute for the fulfillment of the requirement of any course of study.

Place:

Date:

Astha Dadhaniya 92400584069

Signature: \_\_\_\_\_

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Signature: \_\_\_\_\_

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Signature: \_\_\_\_\_

## **ACKNOWLEDGEMENT**

It is indeed a great pleasure to express our thanks and gratitude to all those who helped us. No serious and lasting achievement or success one can ever achieve without the help of friendly guidance and co-operation of so many people involved in the work.

We are very thankful to our guide **Prof. Jaypalsinh Gohil**, the person who makes us to follow the right steps during our project work. We express our deep sense of gratitude to for his /her guidance, suggestions and expertise at every stage. A part from that his/her valuable and expertise suggestion during documentation of our report indeed help us a lot.

Thanks to our friend and colleague who have been a source of inspiration and motivation that helped to us during our project work.

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Krisha Shah	92400584182	Signature: _____

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## Chapter 1

### **INTRODUCTION OF PROJECT DESCRIPTION**

#### **Project Title: - Twistela**

Twistela is a full-featured eCommerce platform enabling users to browse, filter, and purchase products, while offering administrators control over inventory and order management. It supports browsing without login, and enforces login for actions like adding to cart or placing orders. Admins also must authenticate to manage data.

For administrators, the platform ensures role-based access control, enabling only authenticated users to manage inventory, update product details, and handle customer orders. Twistela supports essential eCommerce functionalities such as product categorization, shopping cart, secure checkout, and order tracking. Furthermore, it integrates multiple payment options to improve customer convenience.

The platform leverages modern web technologies for scalability, responsiveness, and security. By digitalizing crochet product sales, Twistela provides value to both customers (through convenience and accessibility) and sellers (through efficient management and data-driven insights).

## Chapter 2

### PREAMBLE

E-Commerce has revolutionized modern shopping by making it faster and easier to access products. Twistela aims to offer a seamless online shopping experience using scalable full-stack technology. It bridges the gap between user satisfaction and admin efficiency, blending product browsing, secure checkout, and real-time inventory management.

#### 2.1 Module Description

##### **Client/User Module**

Users can access and browse products without logging in.

Features include viewing product details, filtering by category and price.

Authentication is required to:

Add products to the cart.

Place an order.

View and manage order history.

Update delivery address.

After login, users can:

Manage their profile.

Track placed orders.

Access personalized features (e.g., saved address, cart).

##### **Admin Module**

Admins can access the site interface without logging in.

Authentication is required to access admin functionalities.

After login, admins can:

Add, edit, and delete product categories.

Perform CRUD operations on product listings.

View and manage all user orders.

Access a secure dashboard to monitor system activity and inventory.

## Chapter 3

### REVIEW OF LITERATURE

#### **Similar Systems Analyzed:**

We analyzed websites like Mindori and Enchanted threads, which specifically sells crochet products, we found they had simple website, which made it easy for customers to find the products they needed, however they do not have an admin side, as they owned a brand.

#### **Major Findings**

User experience must support unauthenticated browsing.  
Admin portals must offer strong CRUD and access control.  
Cart and checkout actions should always require authentication.  
Product filtering and real-time updates enhance user engagement.

## Chapter 4

### TECHNICAL DESCRIPTION

#### 4.1 Hardware Requirement

<b>Processor</b>	Intel i3
<b>RAM</b>	8 GB
<b>Hard Disk</b>	Minimum 250 GB

**Table 4.1 Hardware Requirement**

#### 4.2 Software Requirement

<b>Operating System</b>	Windows
<b>Database</b>	MongoDB + Mongoose
<b>Frontend</b>	React.js, Bootstrap/CSS
<b>Backend</b>	Node.js, Express.js
<b>Authentication</b>	JWT
<b>Code Editor</b>	VS Code

**Table 4.2 Software Requirement**

## Chapter 5

### **SYSTEM DESIGN AND DEVELOPMENT**

#### **Algorithm**

Step 1 Start

Step 2 Display Home Page with product listings and categories

Step 3 IF User is not logged in THEN  
Allow browsing, product viewing, and filter usage.  
IF user clicks "Add to Cart" or "Place Order" THEN  
Redirect to Login/Register.  
On success, continue.

Step 4 IF User is logged in THEN  
Allow full access to:  
Add to Cart  
View/Update Profile  
Place Orders  
View Order History

Step 5 On Checkout  
User selects address and payment option.  
System stores order data in database.  
Display confirmation.

Step 6 IF Admin is not logged in THEN  
Allow viewing the site.  
IF trying to manage product/order data THEN  
Redirect to Admin Login.

Step 7 IF Admin logs in THEN  
Display Admin Dashboard.

Allow:

Add/Edit/Delete Product  
Add/Edit/Delete Categories  
View All Orders

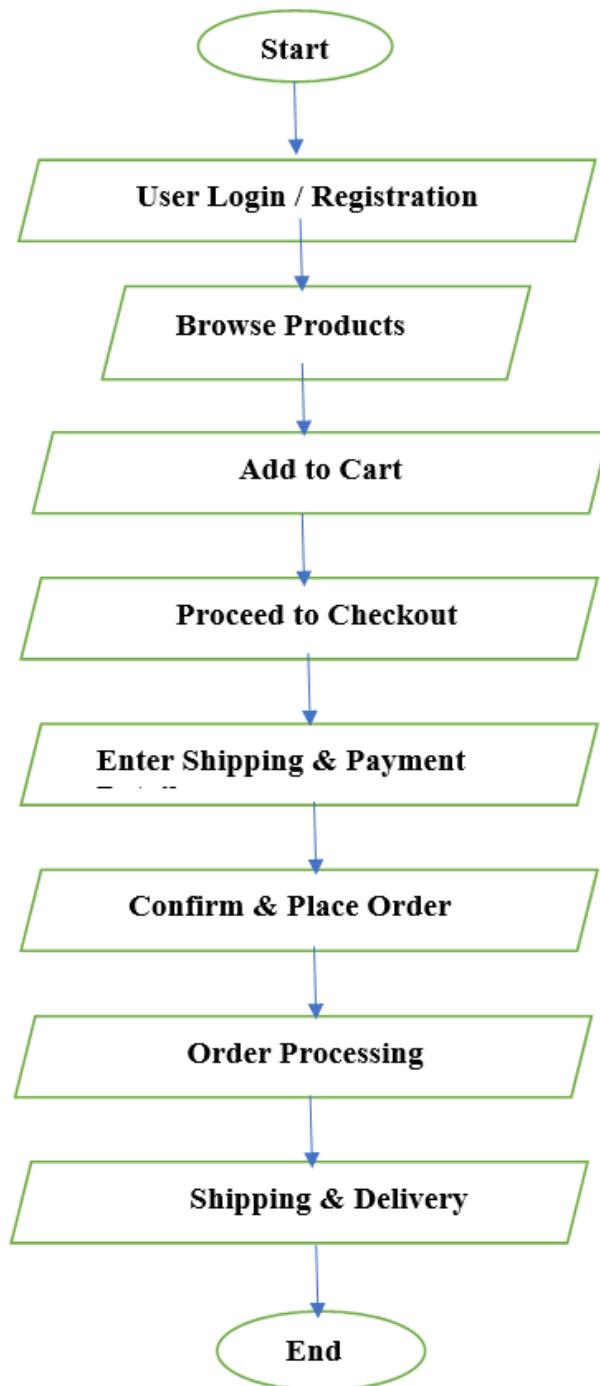
Step 8 Ensure all protected routes are secure with token-based authentication (JWT)

Step 9 Maintain session state using Context API for Cart & Auth

Step 10 Allow Logout from both user and admin

Step 11 End

## FlowChart

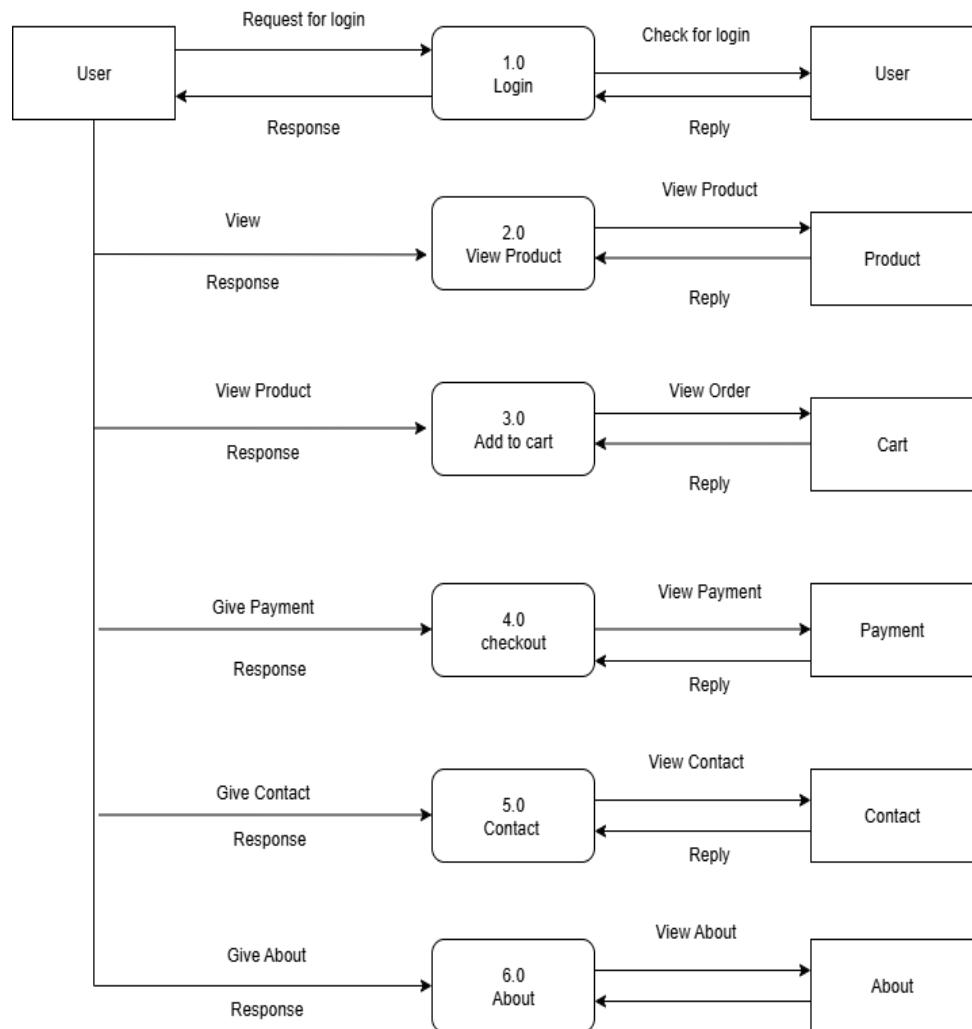


**Figure 5.1 FlowChart**

## DFD



**Figure 5.2 DFD(0 LEVEL)**



**Figure 5.3 DFD (1 LEVEL)**

## Class Diagram

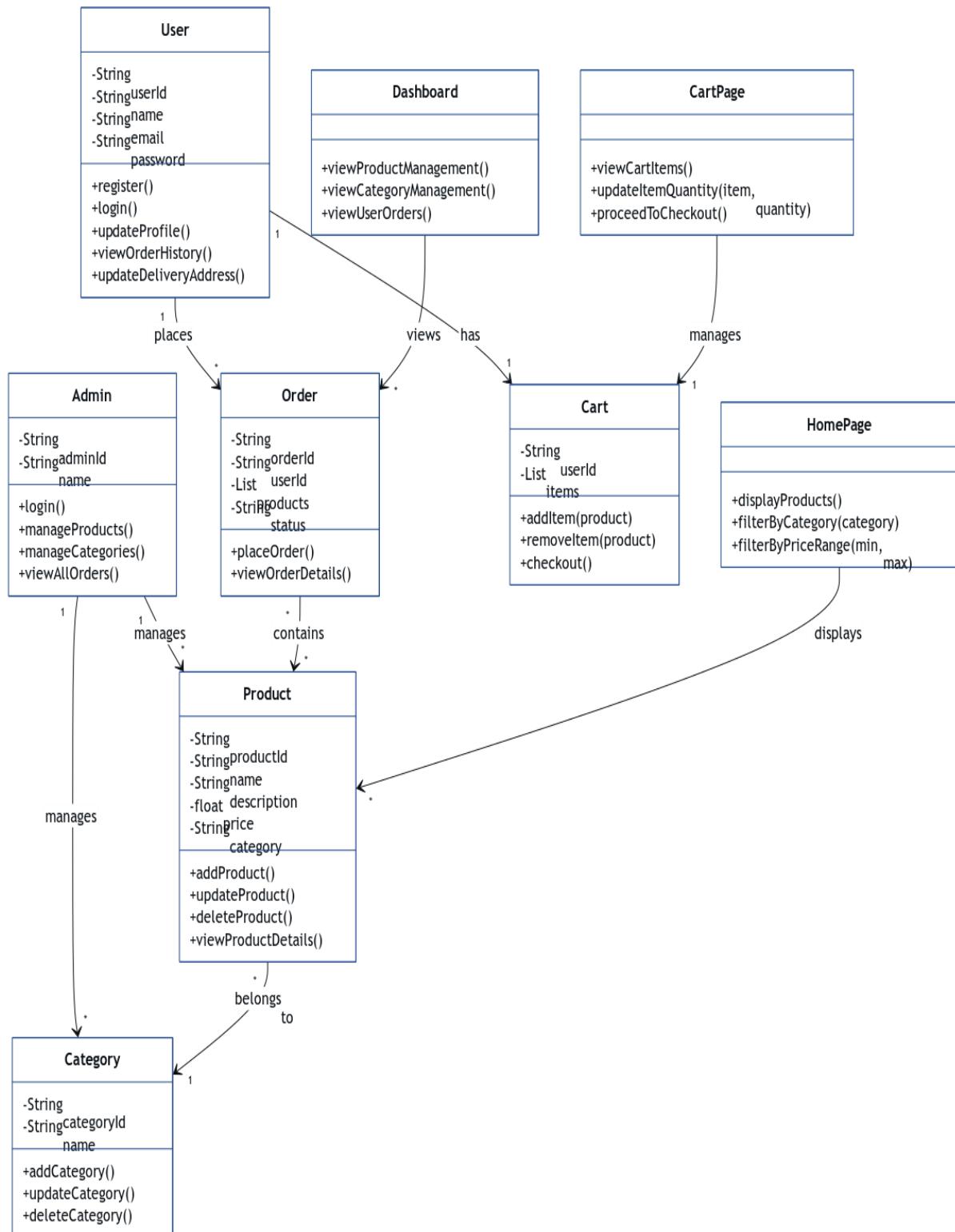
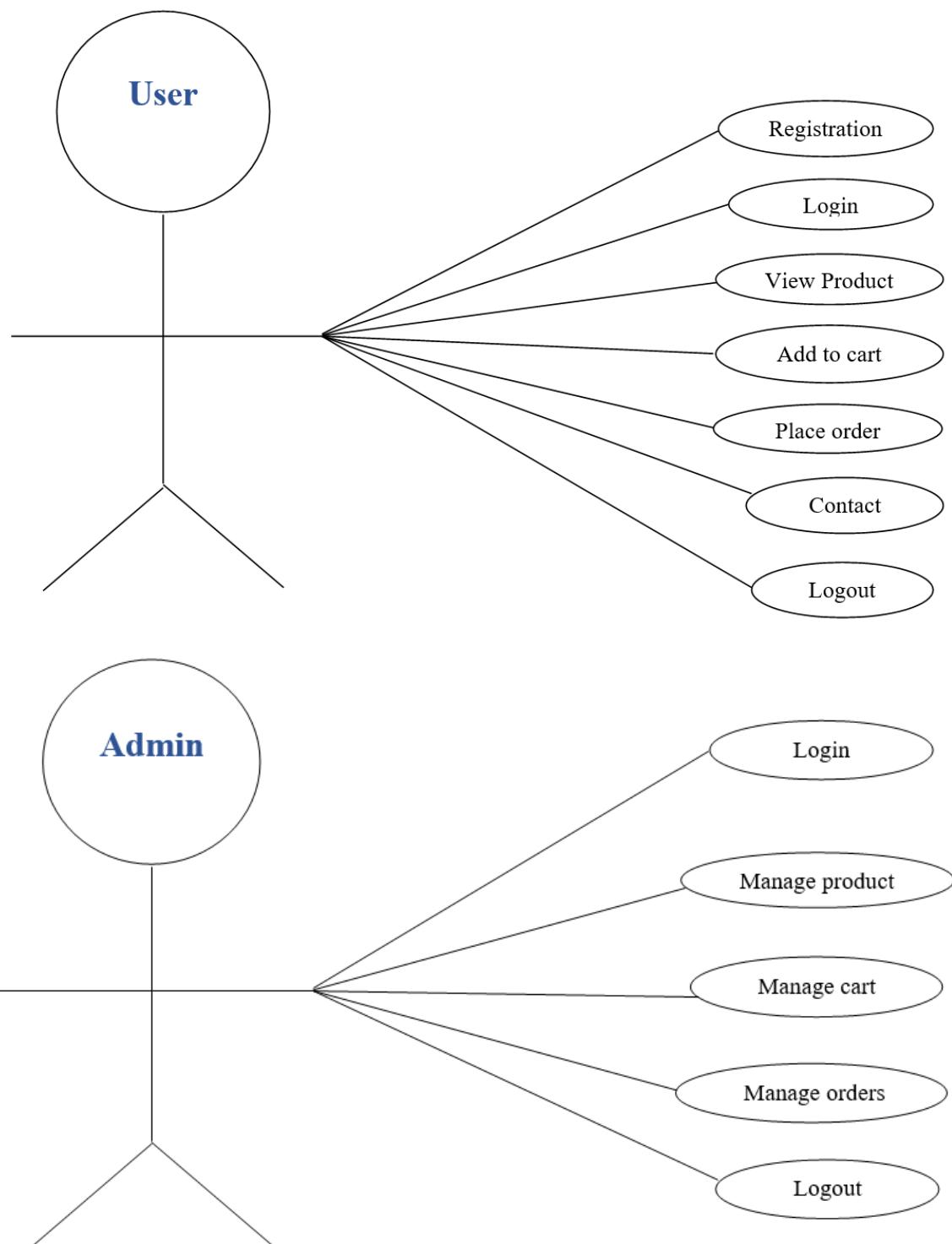
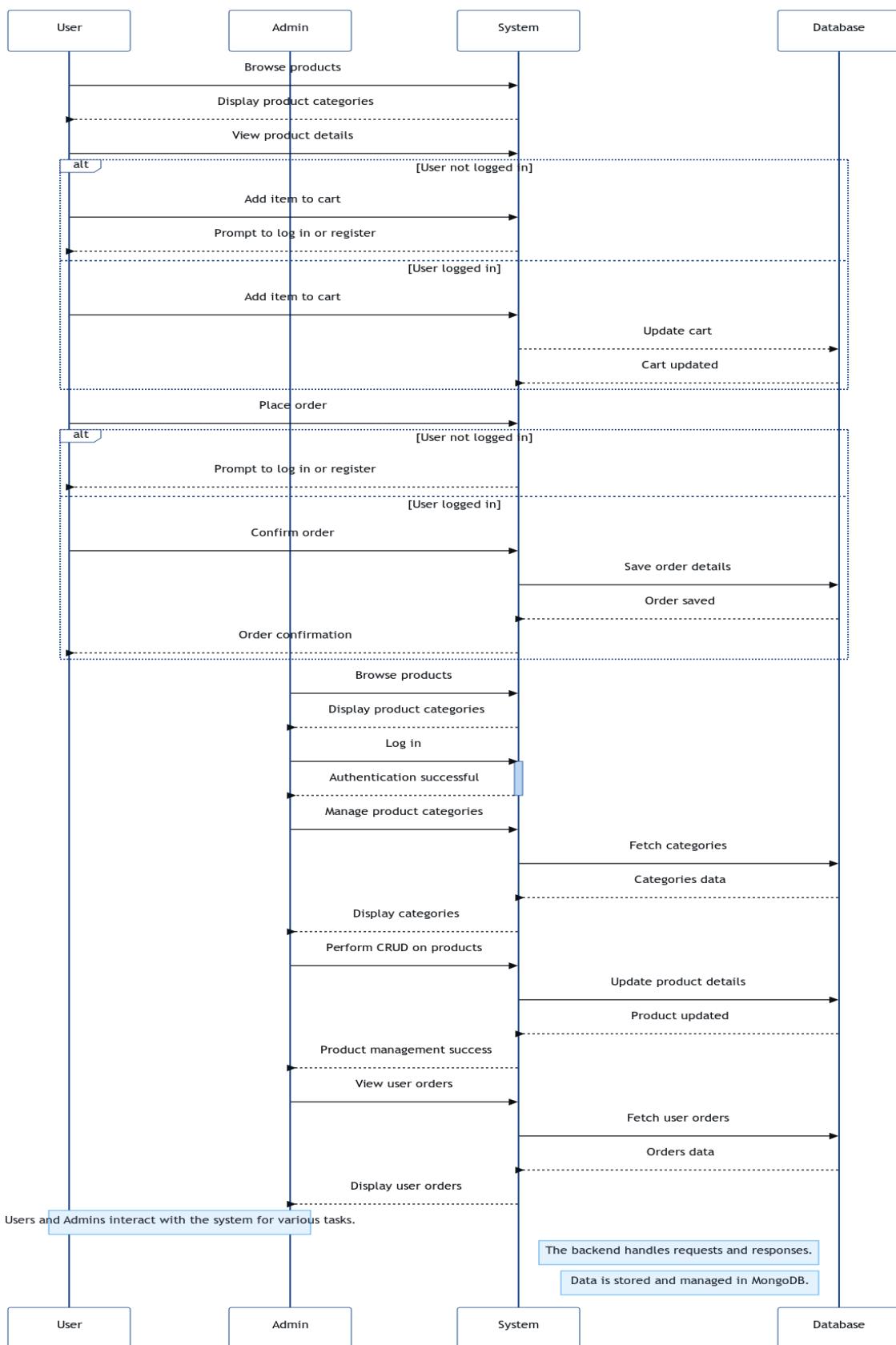


Figure 5.4 Class Diagram

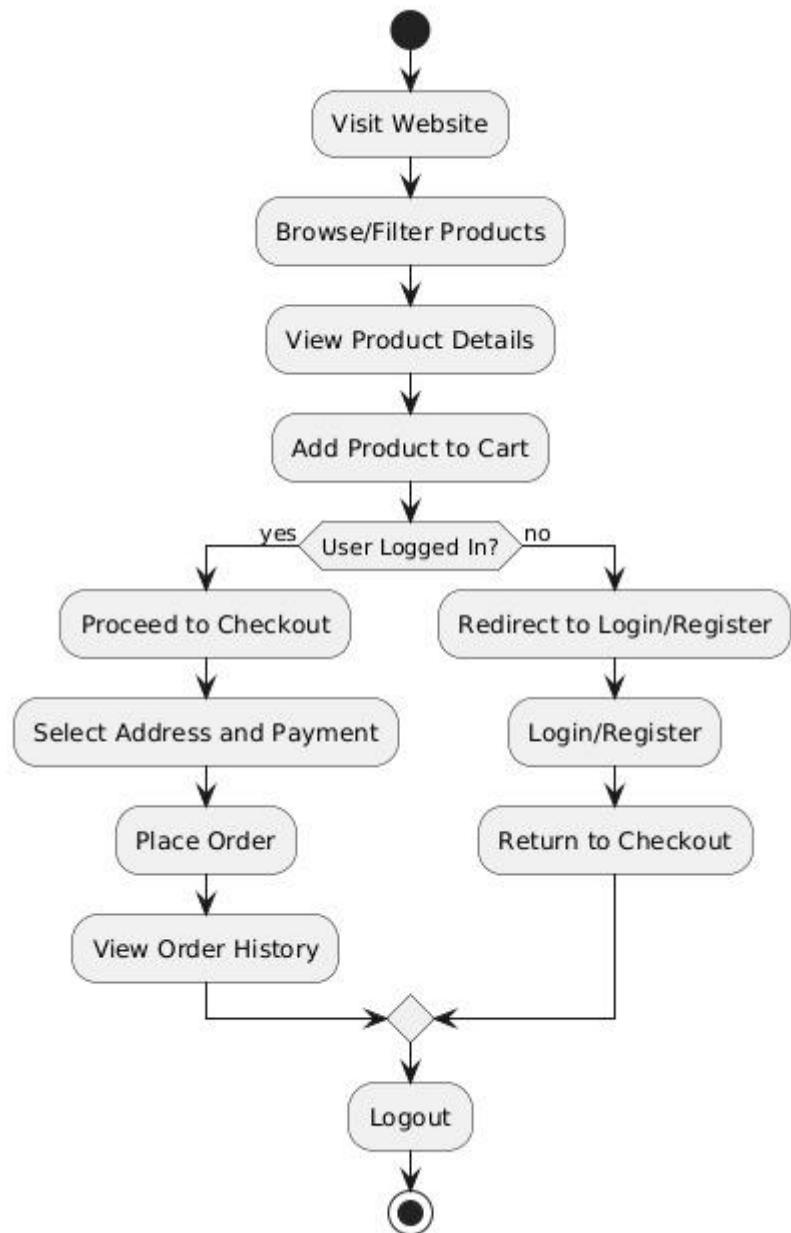
## UseCase Diagram



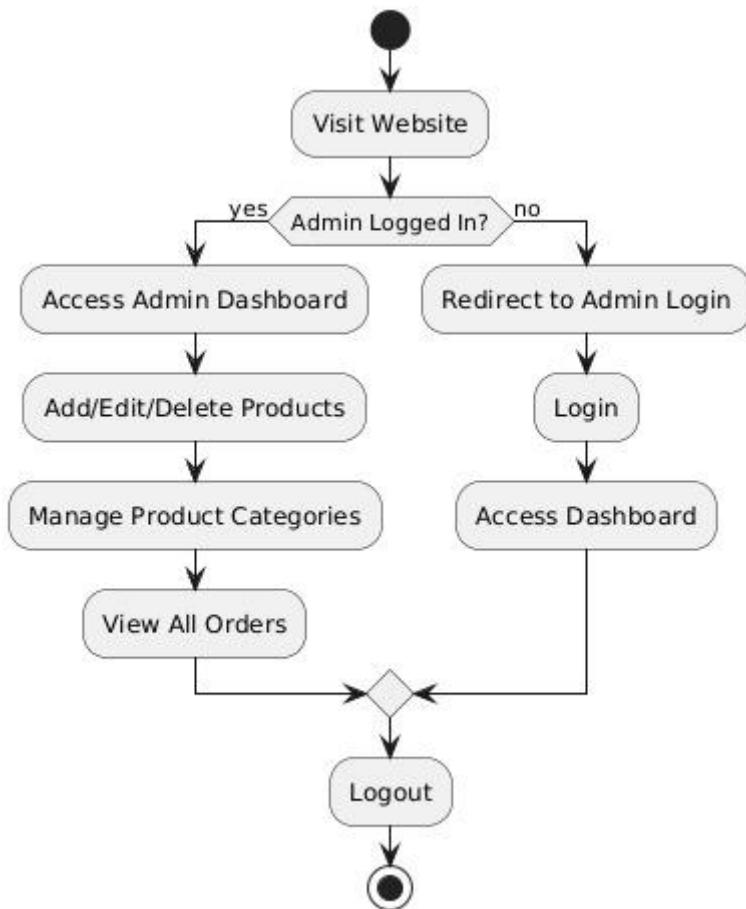
## Figure5.5 UseCase Diagram Sequence Diagram



**Figure 5.6 Sequence Diagram  
Activity Diagram**



**Figure 5.7 Activity Diagram (User)**



**Figure 5.8 Activity Diagram (Admin)**

## State Diagram

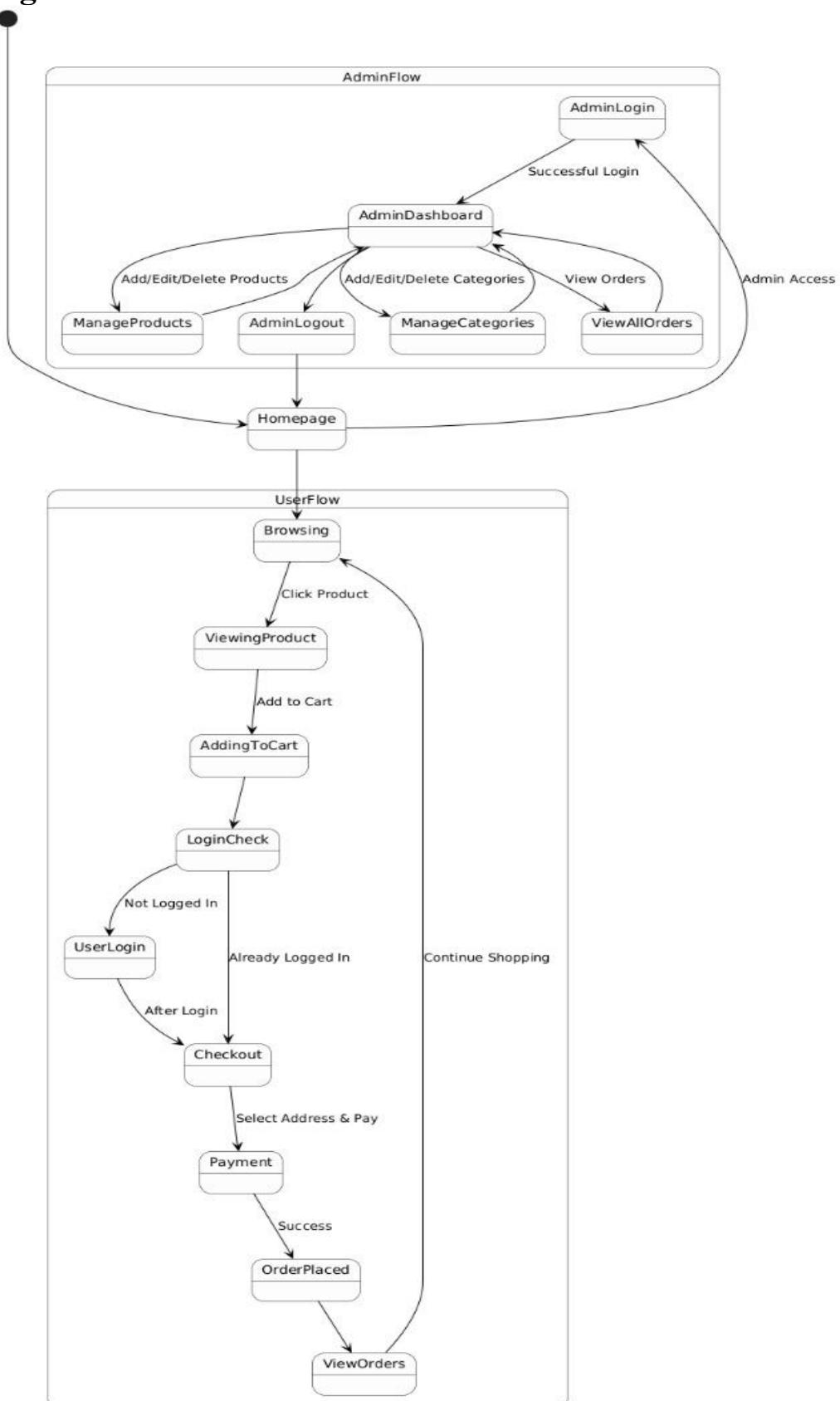


Figure 5.9 State Diagram

## **5.9 Database Design / File Structure**

### **Collections:**

**users**  
**products**  
**orders**  
**categories**

### **Backend Folder Structure:**

/controllers  
/models  
/routes  
/config  
/middleware

### **Frontend Folder Structure:**

/components  
/pages  
/context

## Database Design

The screenshot shows the MongoDB Compass interface connected to the 'localhost:27017/project' database. The 'categories' collection is selected. The interface displays five documents, each representing a category with fields: \_id, name, slug, and \_\_v.

```

_id: ObjectId("6894e53743d55f28dfeffa19")
name: "Flowers"
slug: "flowers"
__v: 0

_id: ObjectId("6894e55643d55f28dfeffa0e")
name: "Wearable"
slug: "wearable"
__v: 0

_id: ObjectId("6894e56243d55f28dfeffa23")
name: "Home Decor"
slug: "home-decor"
__v: 0

_id: ObjectId("6894e56f43d55f28dfeffa28")
name: "Tools"
slug: "tools"
__v: 0

_id: ObjectId("68a1cc84e441f525df61fbfb")
name: "Accessories"
slug: "accessories"
__v: 0

```

Figure 5.10 Categories Data

The screenshot shows the MongoDB Compass interface connected to the 'localhost:27017/project' database. The 'orders' collection is selected. The interface displays 64 documents, each representing an order with fields: \_id, user, items, totalAmount, paymentMethod, address, status, createdAt, updatedAt, and \_\_v.

```

_id: ObjectId("6879e3001aae53fec9f7d036")
user: ObjectId("686b7fe8c518e07cd0c62e33")
items: Array (3)
totalAmount: 1665
paymentMethod: "COD"
address: "Airport road"
status: "Pending"
createdAt: 2025-07-18T06:06:32.079+00:00
updatedAt: 2025-07-18T06:06:32.079+00:00
__v: 0

_id: ObjectId("6894fad143d55f28dfeffb15")
user: ObjectId("686a7d6c92a9a8980dc800df")
items: Array (2)
totalAmount: 1500
paymentMethod: "COD"
address: "xyz"
status: "Pending"
createdAt: 2025-08-07T19:13:21.365+00:00
updatedAt: 2025-08-07T19:13:21.365+00:00
__v: 0

_id: ObjectId("6894fc4a43d55f28dfeffb7e")
user: ObjectId("686b7fe8c518e07cd0c62e33")
items: Array (3)
totalAmount: 3560
paymentMethod: "COD"

```

Figure 5.11 Orders Data

## Ecommerce Website - Twistela

The screenshot shows the MongoDB Compass interface connected to a local host at port 27017. The 'products' collection is selected. The interface displays three documents from the collection:

```
_id: ObjectId('6894eaca43d5f28dfeffa34')
name: "Tulip Flower"
slug: "Tulip-Flower"
description: "These are artificial flowers meticulously crafted from yarn using croc..."
price: 700
category: ObjectId('6894e53743d5f28dfeffa19')
quantity: 5
photo: Object
createdAt: 2025-08-07T18:12:52.295+00:00
updatedAt: 2025-08-07T18:12:52.295+00:00
__v: 0

_id: ObjectId('6894ee1443d5f28dfeffa3d')
name: "Flowers bouquet"
slug: "Flowers-bouquet"
description: "Premium materials for durability and aesthetics and a distinctive and ..."
price: 800
category: ObjectId('6894e53743d5f28dfeffa19')
quantity: 4
photo: Object
createdAt: 2025-08-07T18:19:00.386+00:00
updatedAt: 2025-08-07T18:25:11.972+00:00
__v: 0
shipping: false

_id: ObjectId('6894ef0643d5f28dfeffa47')
name: "Red Rose Flower Pot"
```

Figure 5.12 Products Data

The screenshot shows the MongoDB Compass interface connected to a local host at port 27017. The 'users' collection is selected. The interface displays three documents from the collection:

```
_id: ObjectId('686a7d6c92a9a8988dc898df')
name: "astha"
email: "astha@gmail.com"
password: "$2b$10$ozP83bNVN0tq0lXzmR260PJoxy4r09ktCD2ReJJXm0RqHcoWnG"
phone: "+123456789"
address: "Morbi"
role: 0
createdAt: 2025-07-06T13:43:08.633+00:00
updatedAt: 2025-08-08T09:41:16.468+00:00
__v: 0

_id: ObjectId('686b7fe0c518e07cd0c62e33')
name: "Kreena"
email: "kreena@gmail.com"
password: "$2b$10$niY1MNukfQprnPt7gfoQk.WfLHBxrtCdCfuPvZxEqjHFC90LJAY6"
phone: "+9123456789"
address: "Airport road"
role: 0
createdAt: 2025-07-07T08:05:52.511+00:00
updatedAt: 2025-07-07T08:14:55.764+00:00
__v: 0

_id: ObjectId('689195b0b324a41c65bdabb')
name: "admin"
email: "admin@gmail.com"
password: "$2b$10$Mk0jU6XAmJ2T7LzR3kMk9ek6Emh4CnBo16Qq7dtGx4K/1cAr4JK1G"
phone: "+9123456789"
```

Figure 5.13 Users Data

## Screen Design



Figure 5.14 Home Page

The screenshot shows the admin panel of the Twistela website. The top navigation bar is identical to the home page. The left sidebar, titled "Admin Panel", contains links for "Create Category", "Create Product", "Products", "Orders", and "Users". The main content area is titled "Manage Categories" and displays a table of existing categories. The table has two columns: "Name" and "Actions". The categories listed are Flowers, Wearable, Home Decore, Tools, and Accessories. Each category row includes "Edit" and "Delete" buttons. At the bottom of the page, a pink footer bar contains the text "All Right Reserved © Twistela".

Figure 5.15 Admin Page

TWISTELA

HOME CATEGORIES ▾ ADMIN ▾ CART 0

Admin Panel

Create Category

**Create Product**

Products

Orders

Users

Create Product

Wearable

.trashed-1757219304-IMG\_20250806\_083911.jpg

Baby Cardigan.

The cardigan features a vibrant, multi-colored design composed of individual crocheted squares, some adorned with simple motifs like a star, heart, or smiley face.

1700

9

Yes

CREATE PRODUCT

**Figure 5.16 Add Product**

Admin Panel

Create Category

**Create Product**

Products

Orders

Users

Update Product

Accessories

Upload Photo

Micro crochet earrings

These are handmade earrings crafted using micro crochet techniques, often associated with Amigurumi. They typically feature intricate crocheted patterns, in this case, a white, openwork

999

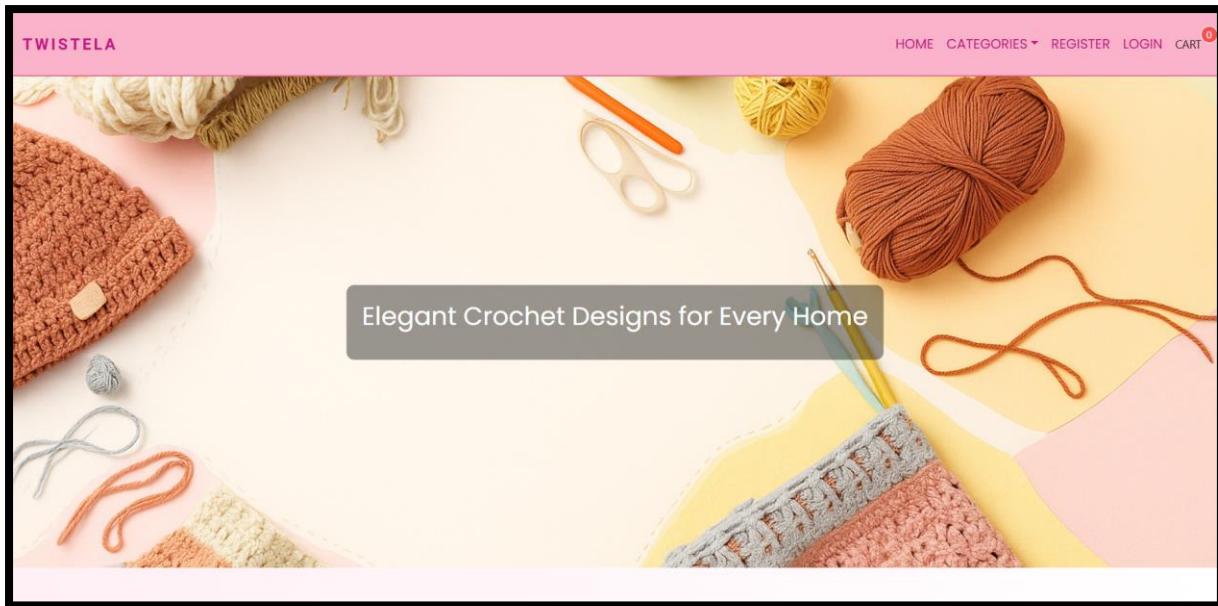
10

No

UPDATE PRODUCT

DELETE PRODUCT

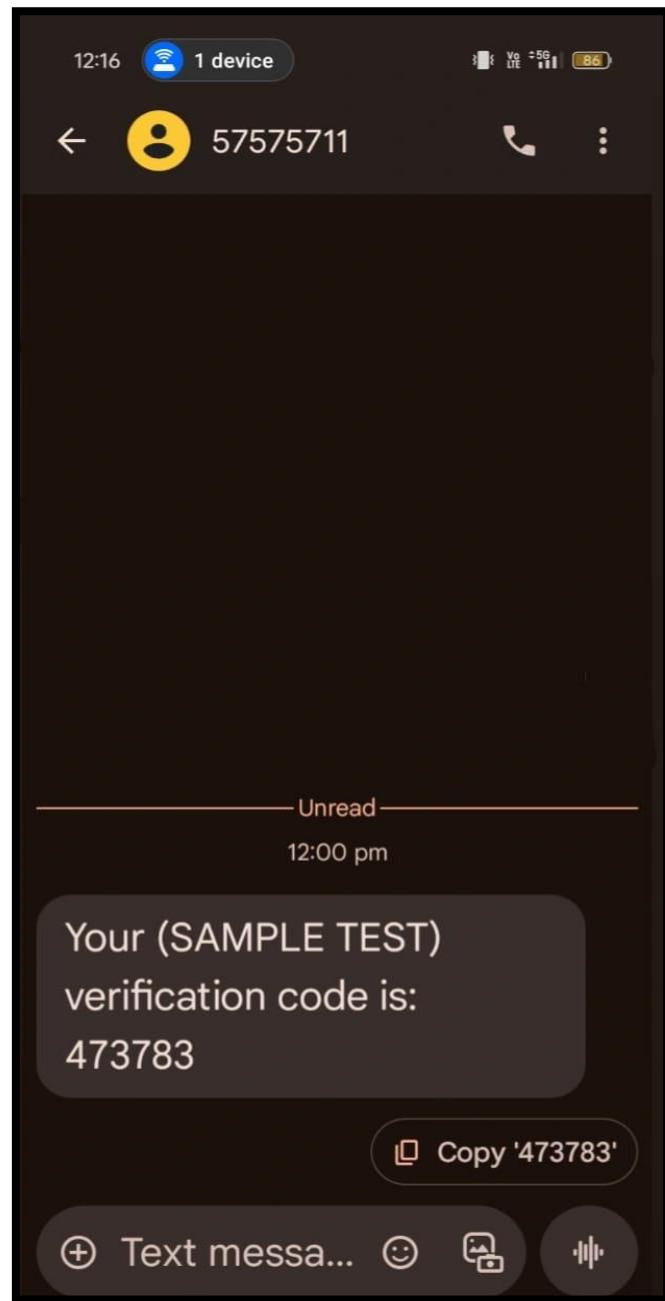
**Figure 5.17 Update Product**



**Figure 5.18 Banner Design**

A screenshot of the Twistela user registration page. The top navigation bar includes a success message "OTP sent successfully!". The main section is titled "Registration Form" and contains fields for Name (Dhairya), Email (dhairyagmail.com), Password (hidden), and Phone Number (+919429556404). A "Send OTP" button is next to the phone number field. Below this is a field for First Name (Morbi) and a placeholder "Enter OTP". A large "Register" button is at the bottom of the form. The footer contains the copyright notice "All Right Reserved © Twistela" and links for About, Contact, and Privacy policy.

**Figure 5.19 User Registration**



**Figure 5.20 SMS on Registered Mobile Number**

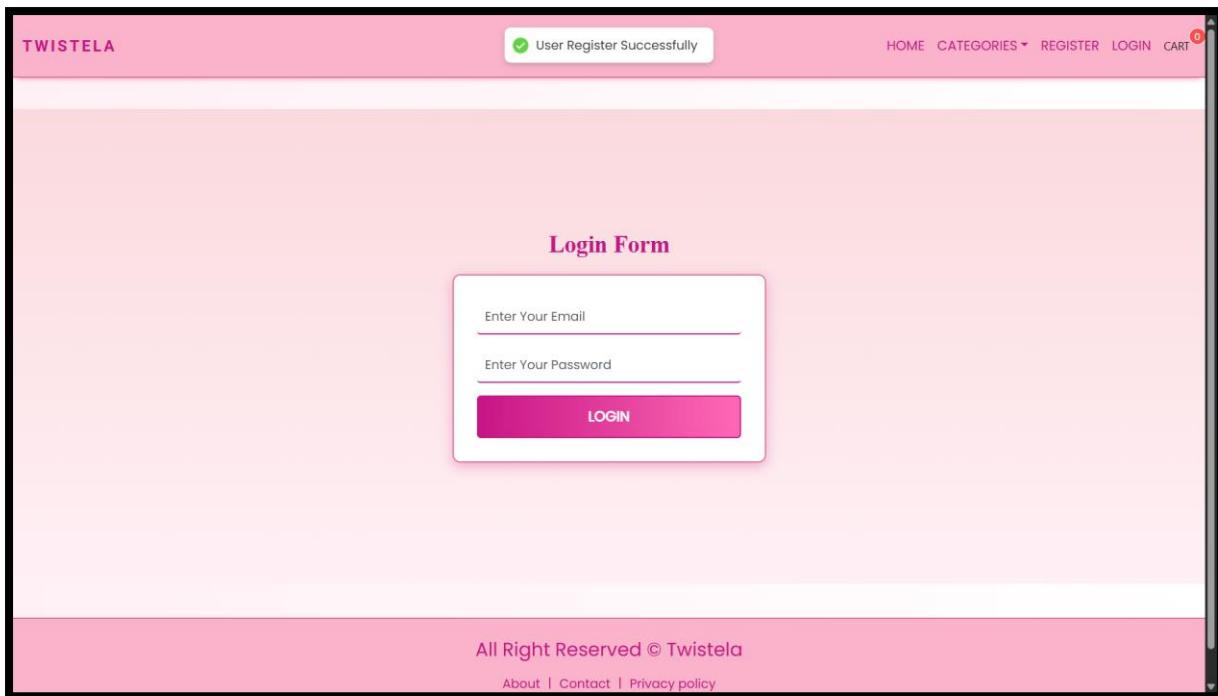


Figure 5.21 Login Page

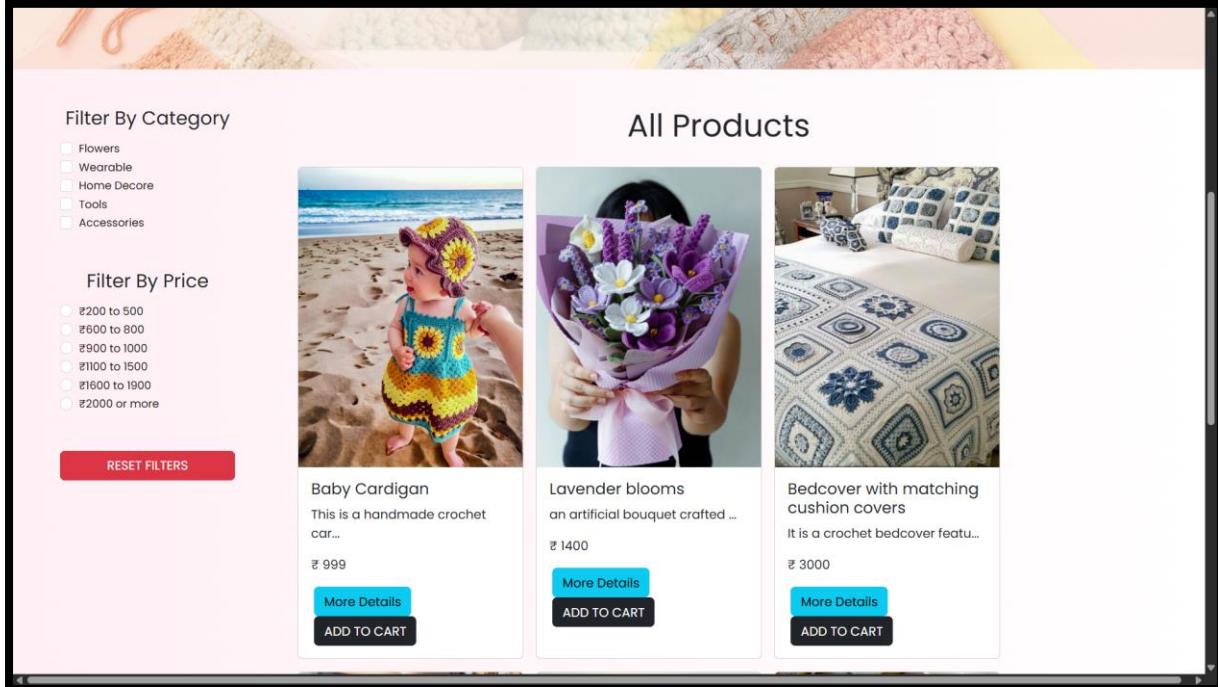


Figure 5.22 All Products Page

### All Products

**Filter By Category**

- Flowers
- Wearable
- Home Decore
- Tools
- Accessories

**Filter By Price**

- ₹200 to 500
- ₹600 to 800
- ₹900 to 1000
- ₹1100 to 1500
- ₹1600 to 1900
- ₹2000 or more

**RESET FILTERS**



**Tulip Flower**  
These are artificial flowers m...  
₹ 700

**More Details** **ADD TO CART**



**Flowers bouquet**  
Premium materials for durabili...  
₹ 800

**More Details** **ADD TO CART**



**Red Rose Flower Pot**  
This item is a handmade croche...  
₹ 1100

**More Details** **ADD TO CART**

**Figure 5.23 Filter by Price**

### All Products

**Filter By Category**

- Flowers
- Wearable
- Home Decore
- Tools
- Accessories

**Filter By Price**

- ₹200 to 500
- ₹600 to 800
- ₹900 to 1000
- ₹1100 to 1500
- ₹1600 to 1900
- ₹2000 or more

**RESET FILTERS**



**Tulip Flower**  
These are artificial flowers m...  
₹ 700

**More Details** **ADD TO CART**



**Flowers bouquet**  
Premium materials for durabili...  
₹ 800

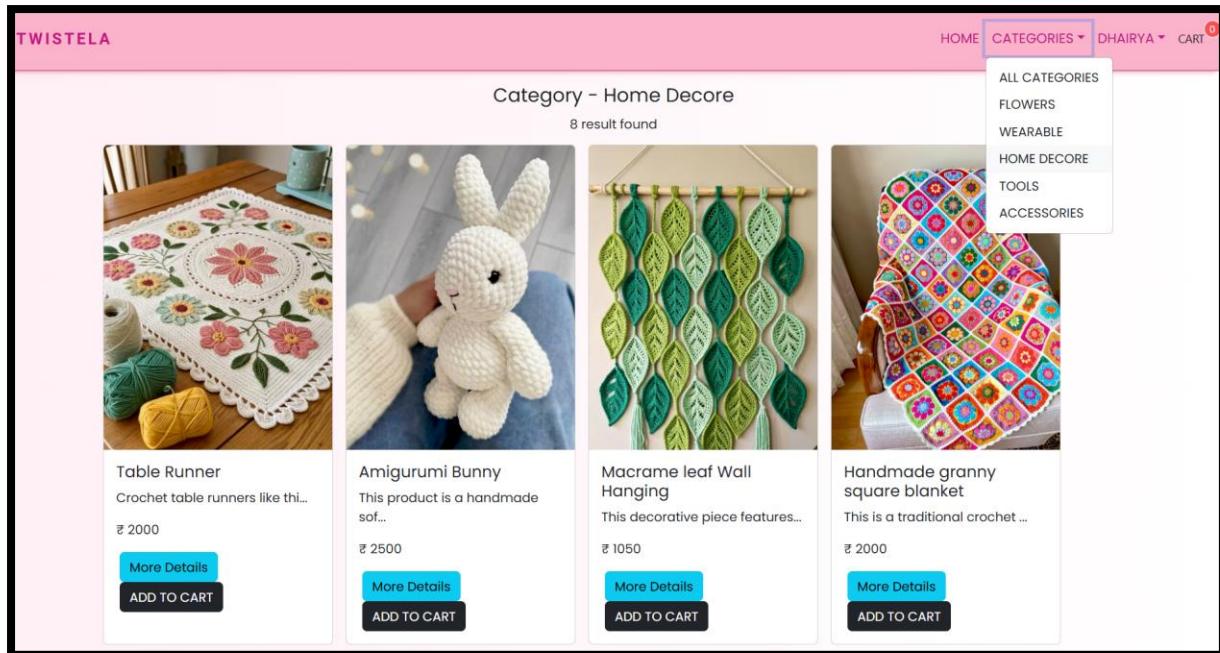
**More Details** **ADD TO CART**



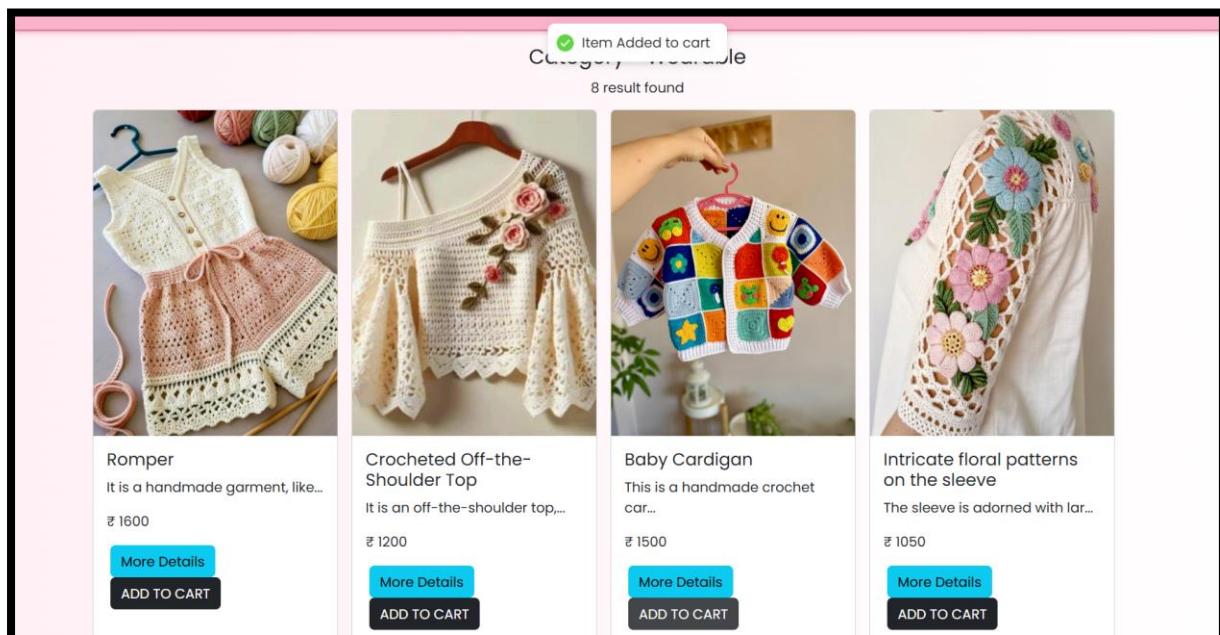
**Embroidery threads and tools**  
The image features numerous sk...  
₹ 799

**More Details** **ADD TO CART**

**Figure 5.24 Filter by Price & Category**



**Figure 5.25 All Categories**



**Figure 5.26 Add to Cart Page**

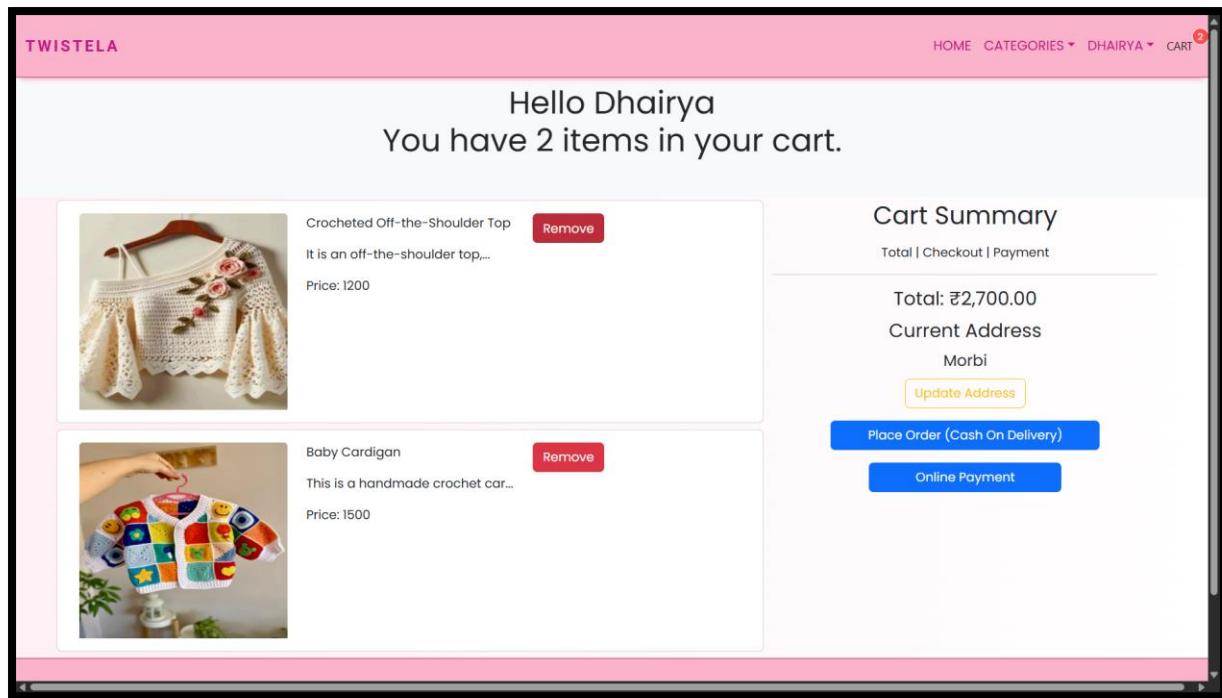


Figure 5.27 Cart Summary Page

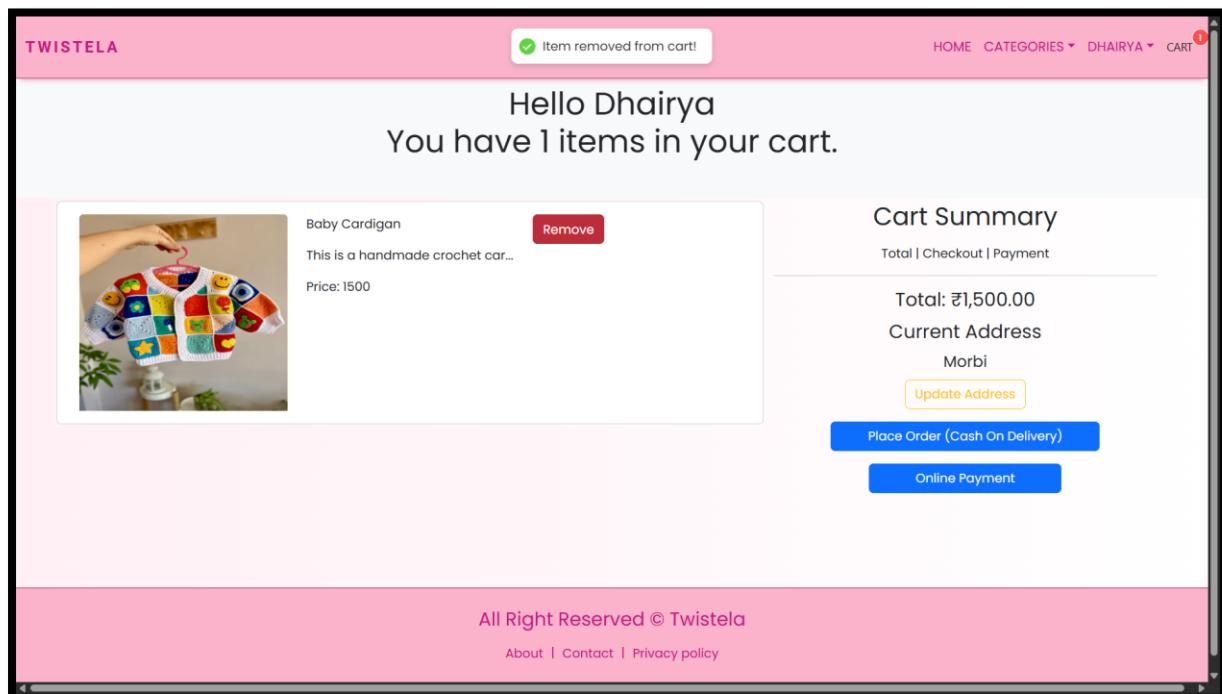
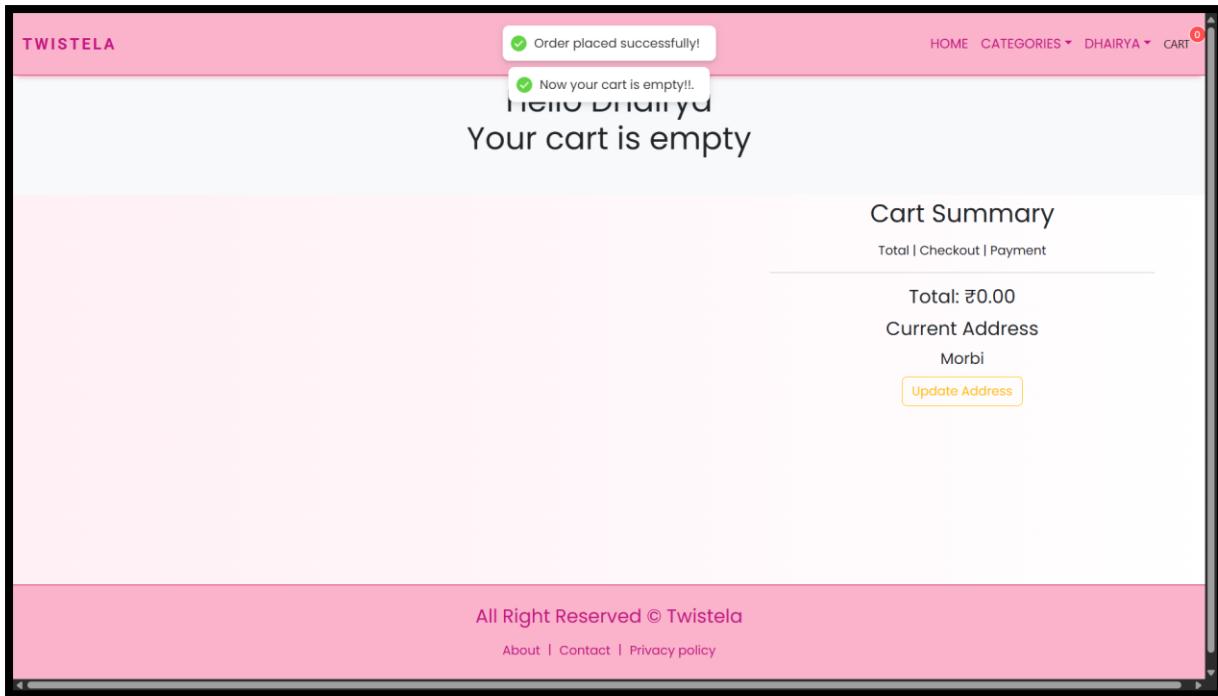
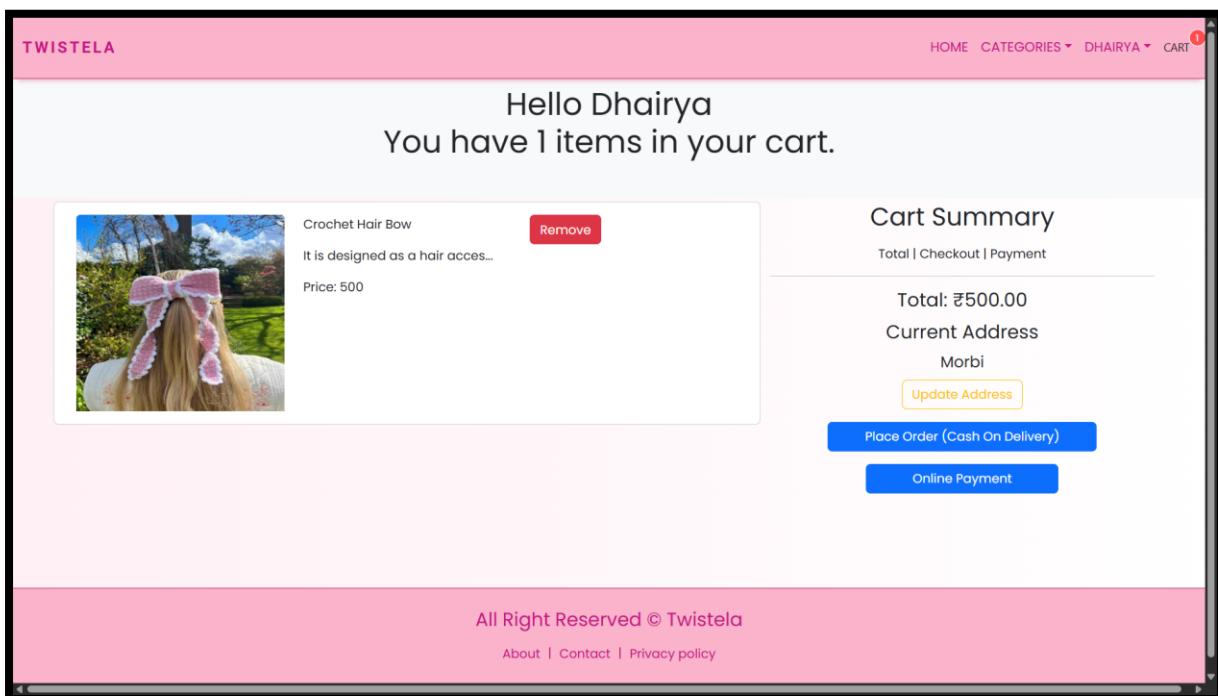


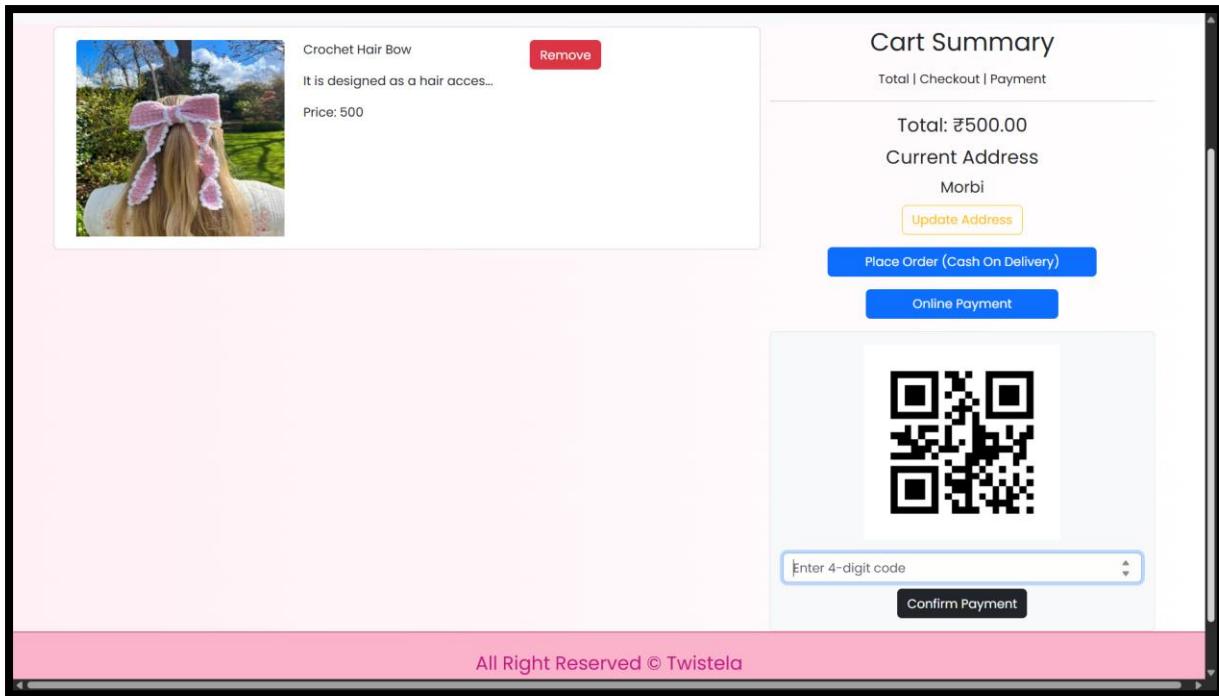
Figure 5.28 Item remove from Cart



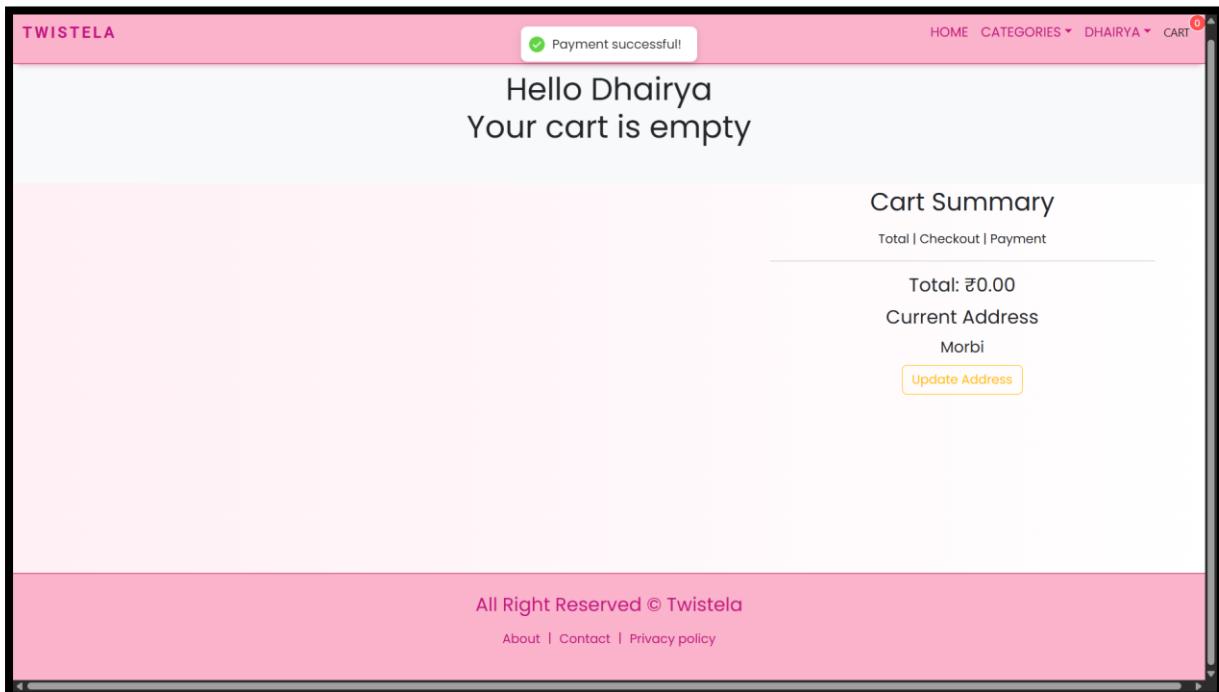
**Figure 5.29 Order placed successfully using COD**



**Figure 5.30 Payment using online method (QR)**



**Figure 5.31 After scanning enter displayed 4 digit number**



**Figure 5.32 Payment Successful**

## Code of the module

### Register.js

```

JS Register.js × JS Login.js × JS server.js
client > src > pages > Auth > JS Register.js > [o] Register
1 import React, { useState } from 'react';
2 import Layout from '../../../../../components/Layout/Layout';
3 import toast from 'react-hot-toast';
4 import axios from 'axios';
5 import { useNavigate } from 'react-router-dom';
6 import "../../../../../styles/AuthStyle.css";
7
8 const Register = () => [
9   const [name, setName] = useState("");
10  const [email, setEmail] = useState("");
11  const [password, setPassword] = useState("");
12  const [phone, setPhone] = useState("");
13  const [address, setAddress] = useState("");
14  const [otp, setOtp] = useState("");
15  const [otpSent, setOtpSent] = useState(false);
16  const navigate = useNavigate();
17
18  // Send OTP
19  const handleSendOtp = async () => {
20    try {
21      const res = await axios.post('/api/v1/auth/send-otp', { phone }); // fixed URL
22      if (res.data.success) {
23        toast.success("OTP sent successfully!");
24        setOtpSent(true);
25      } else {
26        toast.error(res.data.message || "Failed to send OTP");
27      }
28    } catch (error) {
29      console.error(error);
30    }
31  };
32
33  return (
34    <div>
35      <Form>
36        <Input type="text" value={name} onChange={e => setName(e.target.value)} placeholder="Name" />
37        <Input type="text" value={email} onChange={e => setEmail(e.target.value)} placeholder="Email" />
38        <Input type="password" value={password} onChange={e => setPassword(e.target.value)} placeholder="Password" />
39        <Input type="text" value={phone} onChange={e => setPhone(e.target.value)} placeholder="Phone Number" />
40        <Input type="text" value={address} onChange={e => setAddress(e.target.value)} placeholder="Address" />
41        <Button onClick={handleSendOtp}>Send OTP</Button>
42      </Form>
43    </div>
44  );
45}
46
47export default Register;

```

Figure 5.33 Register.js

### Login.js

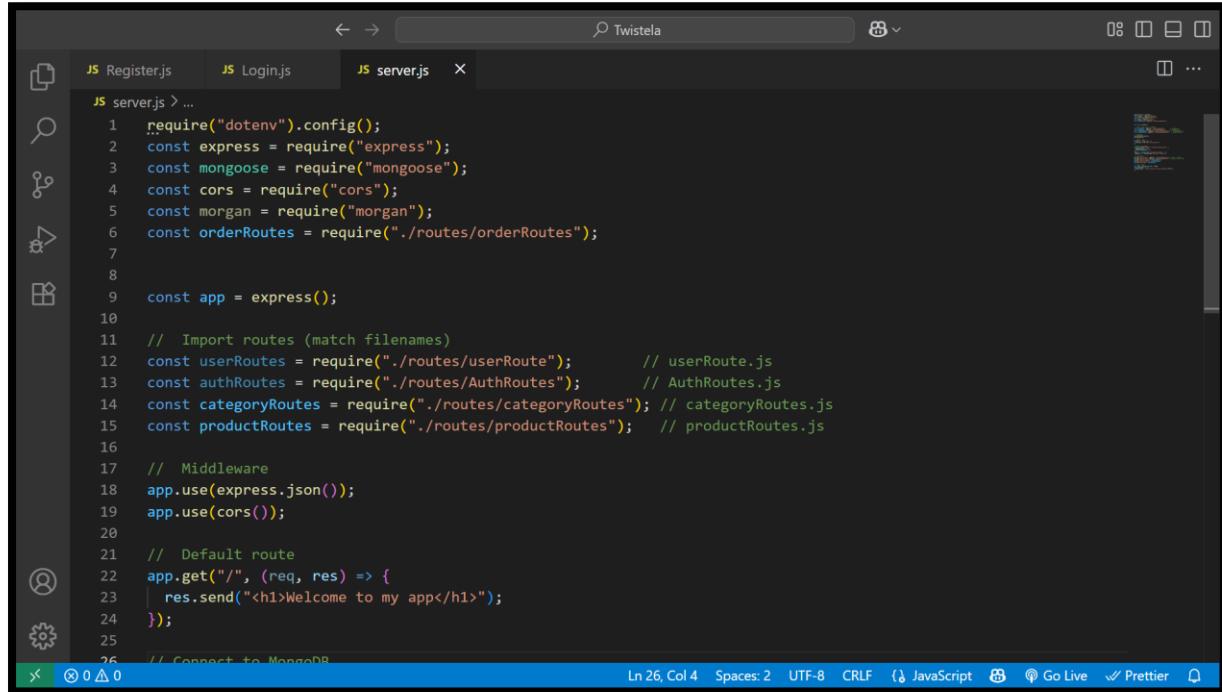
```

JS Register.js × JS Login.js × JS server.js
client > src > pages > Auth > JS Login.js > [o] Login > [o] handleSubmit
1 import React, { useState } from 'react';
2 import Layout from '../../../../../components/Layout/Layout';
3 import toast from 'react-hot-toast';
4 import axios from 'axios';
5 import { useNavigate, useLocation } from 'react-router-dom';
6 import "../../../../../styles/AuthStyle.css";
7 import { useAuth } from '../../../../../context/auth';
8
9 const Login = () => {
10  const [email, setEmail] = useState("");
11  const [password, setPassword] = useState("");
12  const [auth, setAuth] = useAuth();
13
14  const navigate = useNavigate();
15  const location = useLocation();
16
17  const handleSubmit = async (e) => {
18    e.preventDefault();
19    try {
20      // fixed URL
21      const res = await axios.post('/api/v1/auth/login', {
22        email,
23        password
24      });
25
26      if (res && res.data.success) {
27        setAuth(true);
28        navigate(location.state?.from || "/");
29      } else {
30        toast.error(res.data.message || "Login failed");
31      }
32    } catch (error) {
33      console.error(error);
34    }
35  };
36
37  return (
38    <div>
39      <Form>
40        <Input type="text" value={email} onChange={e => setEmail(e.target.value)} placeholder="Email" />
41        <Input type="password" value={password} onChange={e => setPassword(e.target.value)} placeholder="Password" />
42        <Button onClick={handleSubmit}>Login</Button>
43      </Form>
44    </div>
45  );
46}
47
48export default Login;

```

Figure 5.34 Login.js

## Server.js



```

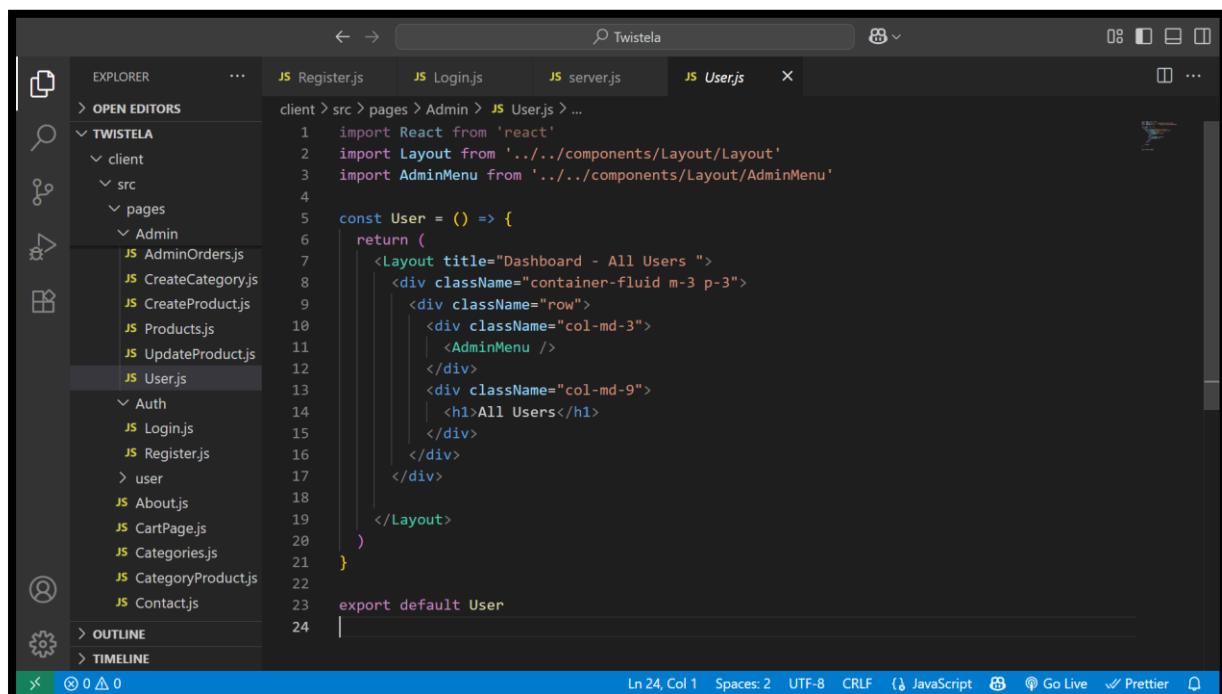
1  require("dotenv").config();
2  const express = require("express");
3  const mongoose = require("mongoose");
4  const cors = require("cors");
5  const morgan = require("morgan");
6  const orderRoutes = require("./routes/orderRoutes");
7
8
9  const app = express();
10
11 // Import routes (match filenames)
12 const userRoutes = require("./routes/userRoute");           // userRoute.js
13 const authRoutes = require("./routes/AuthRoutes");          // AuthRoutes.js
14 const categoryRoutes = require("./routes/categoryRoutes"); // categoryRoutes.js
15 const productRoutes = require("./routes/productRoutes");   // productRoutes.js
16
17 // Middleware
18 app.use(express.json());
19 app.use(cors());
20
21 // Default route
22 app.get("/", (req, res) => {
23   res.send("<h1>Welcome to my app</h1>");
24 });
25
26 // Connect to MongoDB

```

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Figure 5.35 Server.js

## User.js



```

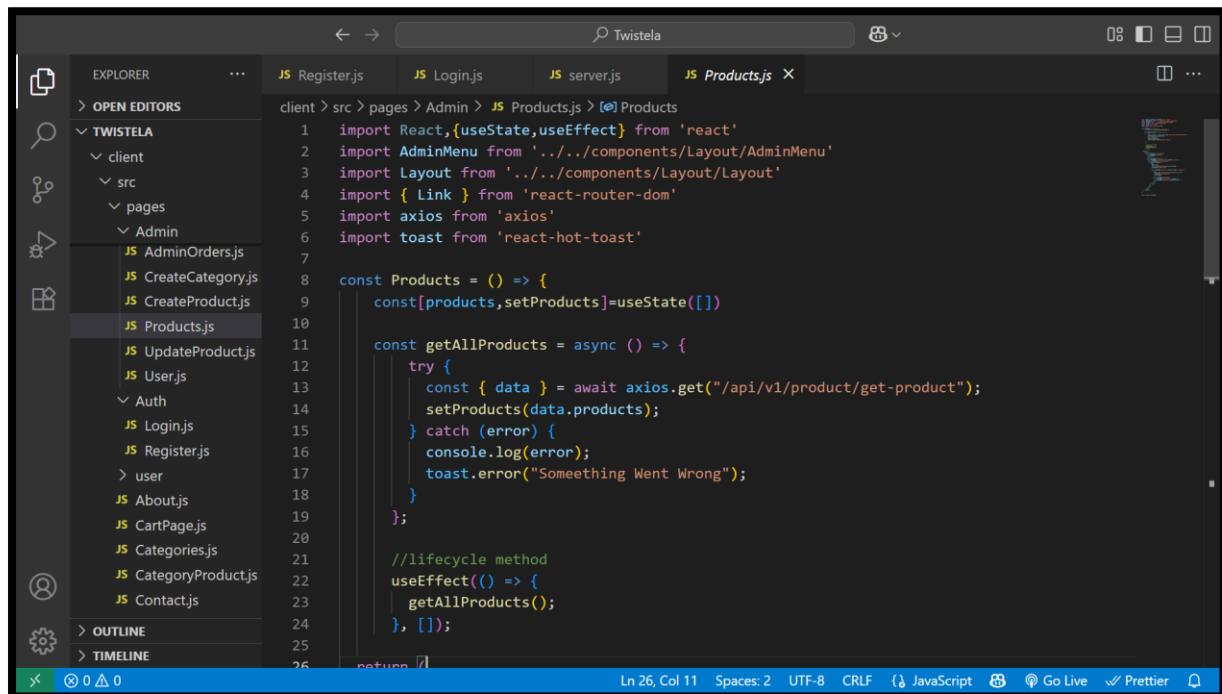
1 import React from 'react'
2 import Layout from '../../../../../components/Layout/Layout'
3 import AdminMenu from '../../../../../components/Layout/AdminMenu'
4
5 const User = () => {
6   return (
7     <Layout title="Dashboard - All Users" >
8       <div className="container-fluid m-3 p-3" >
9         <div className="row" >
10           <div className="col-md-3" >
11             <AdminMenu />
12           </div>
13           <div className="col-md-9" >
14             <h1>All Users</h1>
15           </div>
16         </div>
17       </div>
18     </Layout>
19   }
20
21 }
22
23 export default User

```

Ln 24, Col 1 Spaces: 2 UTF-8 CRLF ⓘ JavaScript ⓘ Go Live ⓘ Prettier

Figure 5.36 User.js

## Product.js



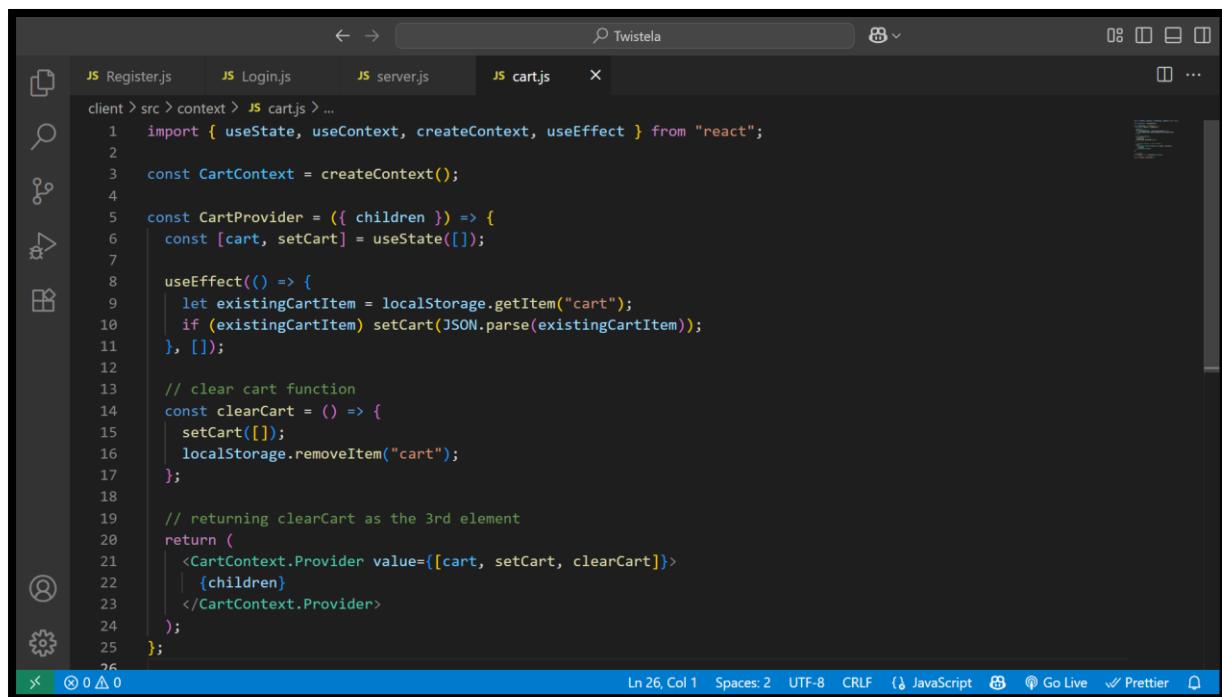
```

client > src > pages > Admin > JS Products.js > Products
1  import React,{useState,useEffect} from 'react'
2  import AdminMenu from '../../../../../components/Layout/AdminMenu'
3  import Layout from '../../../../../components/Layout/Layout'
4  import { Link } from 'react-router-dom'
5  import axios from 'axios'
6  import toast from 'react-hot-toast'
7
8  const Products = () => {
9    const[products,setProducts]=useState([])
10
11   const getAllProducts = async () => {
12     try {
13       const { data } = await axios.get("/api/v1/product/get-product");
14       setProducts(data.products);
15     } catch (error) {
16       console.log(error);
17       toast.error("Something Went Wrong");
18     }
19   };
20
21   //lifecycle method
22   useEffect(() => {
23     getAllProducts();
24   }, []);
25
26  return (
27    ...
28  )

```

**Figure 5.37 Product.js**

## Cart.js



```

client > src > context > JS cart.js > ...
1  import { useState, useContext, createContext, useEffect } from "react";
2
3  const CartContext = createContext();
4
5  const CartProvider = ({ children }) => {
6    const [cart, setCart] = useState([]);
7
8    useEffect(() => {
9      let existingCartItem = localStorage.getItem("cart");
10      if (existingCartItem) setCart(JSON.parse(existingCartItem));
11    }, []);
12
13    // clear cart function
14    const clearCart = () => {
15      setCart([]);
16      localStorage.removeItem("cart");
17    };
18
19    // returning clearCart as the 3rd element
20    return (
21      <CartContext.Provider value={[cart, setCart, clearCart]}>
22        {children}
23      </CartContext.Provider>
24    );
25  };
26

```

**Figure 5.38 Cart.js**

## Chapter 6

### **SYSTEM TESTING**

System testing for "Twistela" involves validating the end-to-end functionality of the entire system to ensure it meets the requirements and functions correctly under expected conditions, validate its correctness and confirm that all components are integrated properly. Below is a structured approach to writing the System Testing section in your project report for the Ecommerce Website.

Key Modules to test :

1. User Registration
2. User Login
3. Invalid Login
4. OTP Send
5. OTP Verification
6. Product Add
7. Add to Cart
8. Remove from Cart
9. Payment Failure

## **6.1 Functional Testing:**

<b>Test ID</b>	<b>Test Scenario</b>	<b>Test Steps</b>	<b>Expected Result</b>
F001	User Registration	Navigate to signup → Fill form → Submit	New user account created in database
F002	User Login	Enter valid credentials	User successfully logs in
F003	Invalid Login	Attempt login with wrong password	System should deny login
F004	OTP Send	Trigger login with OTP → System sends OTP	OTP received on registered mobile
F005	OTP Verification	Enter OTP (Correct → success, Wrong → error)	Correct OTP → login success, Wrong OTP → error shown
F006	Product Add	Admin navigates to product section → Add new product details	Product saved in database
F007	Add to Cart	Select product → Click "Add to Cart"	Product added successfully to cart
F008	Remove from Cart	Go to cart → Remove product	Product removed successfully
F009	Payment Failure	Simulate payment failure during checkout	Order not placed, error shown

**Table 6.1 Functional Testing:**

## **6.2 Test Case Table For Ecommerce Twistela:**

<b>Test Case ID</b>	<b>Module</b>	<b>Test Case Description</b>	<b>Preconditions</b>	<b>Test Steps</b>	<b>Expected Result</b>	<b>Actual Result</b>	<b>Status</b>
TC01	User Authentication	Verify user registration with valid details	Application is running, internet available	1. Go to "Sign Up" page → Enter email, password → Click Register	New user account created in database	As Expected	Pass
TC02	User Authentication	Verify login with valid credentials	User account exists	1. Go to "Login" page → Enter valid credentials → Click Login	User successfully logs in	As Expected	Pass
TC03	User Authentication	Invalid login with wrong credentials	User account exists	1. Go to "Login" page → Enter invalid	System should deny login	As Expected	Pass

				d pass word → Click Login			
TC0 4	User Authent ication	OTP Generation	User account exists, mobile registered	1. Trigg er OTP send reque st	OTP received on registered phone	As Expect ed	Pass
TC0 5	User Authent ication	OTP Verification	OTP already generated	1. Enter corre ct OTP → Login succe ss 2. Enter wron g OTP → Error show n	Correct OTP → success, Wrong OTP → error	As Expect ed	Pass
TC0 6	Product Manage ment	Add new product	Admin account exists	1. Admi n navig ates to produ ct sectio n → Enter produ ct	Product saved in database	As Expect ed	Pass

				details → Save			
TC07	Cart Management	Add product to cart	User logged in, product available	1. Select product → Click "Add to Cart"	Product added successfully to cart	As Expected	Pass
TC08	Cart Management	Remove product from cart	Product already in cart	1. Go to cart → Click "Remove" on product	Product removed successfully	As Expected	Pass
TC09	Payment	Simulate payment failure during checkout	User has items in cart	1. Proceed to checkout → Simulate failure	Order not placed, error message shown	As Expected	Pass

**Table 6.2 Test Case Table For Ecommerce Twistela:**

## Chapter 7

### CONCLUSION

The Twistela application successfully demonstrates the implementation of a modern e-commerce platform using the MERN stack. By integrating MongoDB, Express.js, React.js, and Node.js, the project ensures a scalable, efficient, and user-friendly environment for managing crochet product sales. Core features such as user registration, OTP-based authentication, product management, cart, and checkout flow have been implemented to simulate real-world online shopping. These modules collectively provide both customers and administrators with a seamless experience.

Throughout the development process, various test cases were executed to validate system functionalities, such as login verification, OTP handling, product addition, cart operations, and payment handling. The system achieved its expected outcomes across critical functionalities, confirming its stability and reliability. Moreover, the modular architecture of the MERN stack enables future enhancements, such as integrating secure payment gateways, improving UI/UX, and adding advanced analytics for sales tracking.

In conclusion, this project demonstrates not only technical skills in full-stack development but also the ability to design a complete business solution. Twistela can be further extended into a fully functional online crochet marketplace, bridging the gap between handmade product creators and customers through a robust digital platform.

## Chapter 8

### LEARNING DURING PROJECT WORK

- **End-to-end MERN wiring:** React views  $\leftrightarrow$  Express APIs  $\leftrightarrow$  MongoDB models.
- **State & routing:** React Router, context/state for auth and cart.
- **Secure auth:** JWT guards for user/admin; route-level protection.
- **OTP workflow:** Integrating SMS OTP flow and handling invalid/expired codes.
- **Data modeling:** Schemas for users, products, categories, orders.
- **Admin ergonomics:** CRUD dashboards and instant storefront reflection.
- **Error handling:** Consistent API errors and UI toasts.
- **Version control & teamwork:** Branching, reviews, merge hygiene.
- **UX for catalog & filters:** Clear categories/price bands improve discovery.
- **Deployment readiness:** Env vars, build scripts, basic logging/monitoring.

## 8.1 Future Enhancements

- **Payments:** Razorpay/Stripe, order status webhooks.
- **Order tracking:** Shipment status timeline + notifications.
- **Inventory & variants:** Sizes/colors; low-stock alerts.
- **Wishlists & reviews:** Social proof and retention.
- **Coupons & promotions:** Category/product-level discounts.
- **Media optimization:** Image CDN/compression for faster galleries.
- **PWA:** Installable app, offline product browsing.
- **Role-based admin:** Manager vs. super-admin; audit logs.
- **Accessibility & i18n:** Alt text, keyboard support; multi-language.
- **Security hardening:** Rate limits on OTP/login; refresh tokens.

## Chapter 9

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