

```
In [3]: import pandas as pd
```

```
In [6]: df = pd.read_csv("C:/exam/hardware_sales.csv")
```

```
In [7]: df.head()
```

```
Out[7]:
```

	Invoice ID	Date	Product	Category	Quantity Sold	Unit Price	Total Price	Cost Price	Branch	Supplier	Cus
0	HW001	2024-01-05	Drill Machine	Power Tools	2	3500	7000	6000	Delhi	Bosch	
1	HW002	2024-01-06	Hammer	Hand Tools	5	250	1250	1000	Mumbai	Stanley	
2	HW003	2024-01-07	Cement Bag	Building Materials	10	350	3500	3000	Bangalore	Ultratech	
3	HW004	2024-01-08	Paint Bucket (10L)	Paints	3	1200	3600	3000	Delhi	Asian Paints	
4	HW005	2024-01-09	Wire Cutter	Hand Tools	4	400	1600	1300	Mumbai	Taparia	

```
In [9]: df['Profit'] = df['Total Price'] - df['Cost Price']
```

```
In [10]: df.head()
```

```
Out[10]:
```

	Invoice ID	Date	Product	Category	Quantity Sold	Unit Price	Total Price	Cost Price	Branch	Supplier	Cus
0	HW001	2024-01-05	Drill Machine	Power Tools	2	3500	7000	6000	Delhi	Bosch	
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```
In [11]: total_revenue = df['Total Price'].sum()
total_cost = df['Cost Price'].sum()
total_profit = df['Profit'].sum()

print("Total Revenue: ₹", total_revenue)
print("Total Cost: ₹", total_cost)
print("Total Profit: ₹", total_profit)
```

Total Revenue: ₹ 32550

Total Cost: ₹ 27860

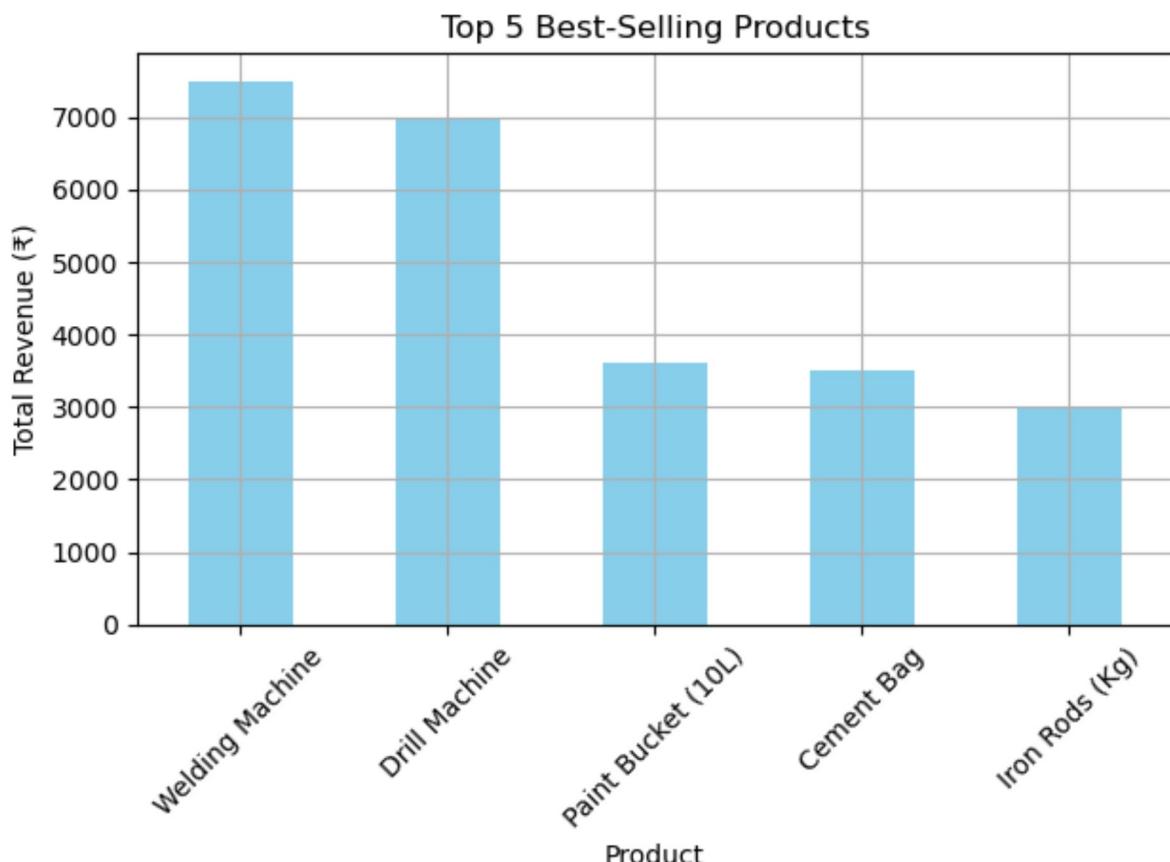
Total Profit: ₹ 4690

```
In [12]: top_products = df.groupby('Product')['Total Price'].sum().sort_values(ascending=False)
print(top_products)
```

```
Product
Welding Machine      7500
Drill Machine        7000
Paint Bucket (10L)   3600
Cement Bag            3500
Iron Rods (Kg)        3000
Name: Total Price, dtype: int64
```

```
In [13]: import matplotlib.pyplot as plt

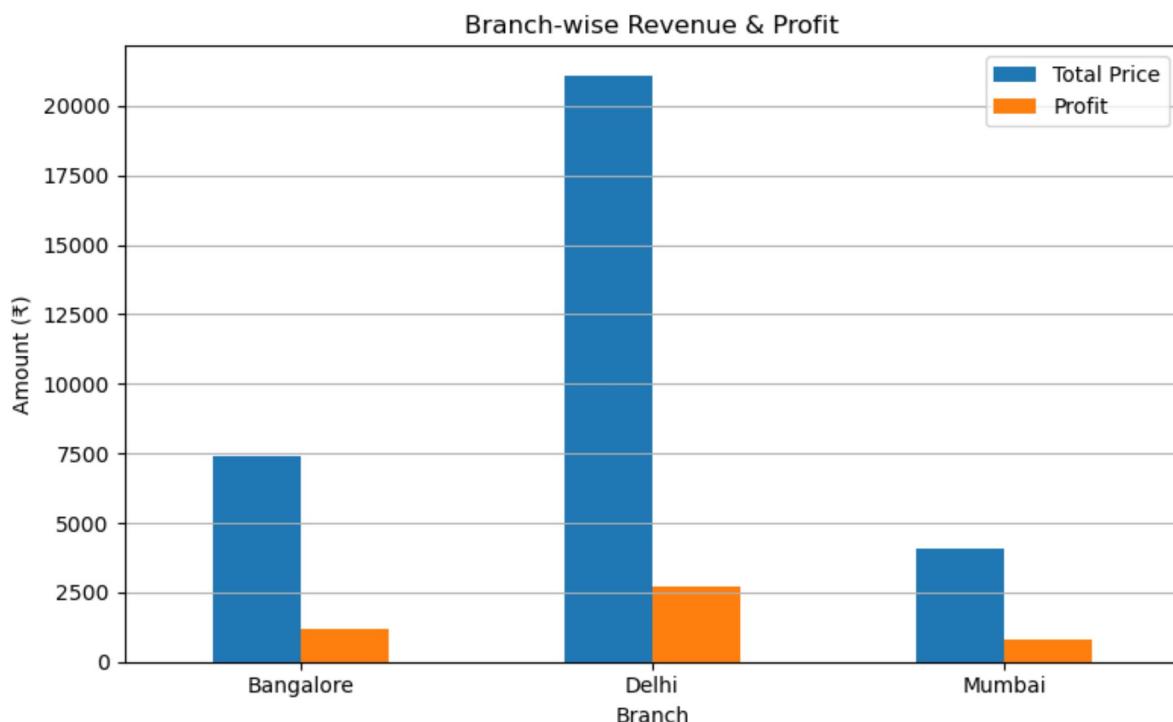
top_products.plot(kind='bar', color='skyblue')
plt.title("Top 5 Best-Selling Products")
plt.xlabel("Product")
plt.ylabel("Total Revenue (₹)")
plt.xticks(rotation=45)
plt.grid(True)
plt.tight_layout()
plt.show()
```



```
In [14]: branch_sales = df.groupby('Branch')[['Total Price', 'Profit']].sum()
print(branch_sales)
```

Branch	Total Price	Profit
Bangalore	7400	1200
Delhi	21100	2700
Mumbai	4050	790

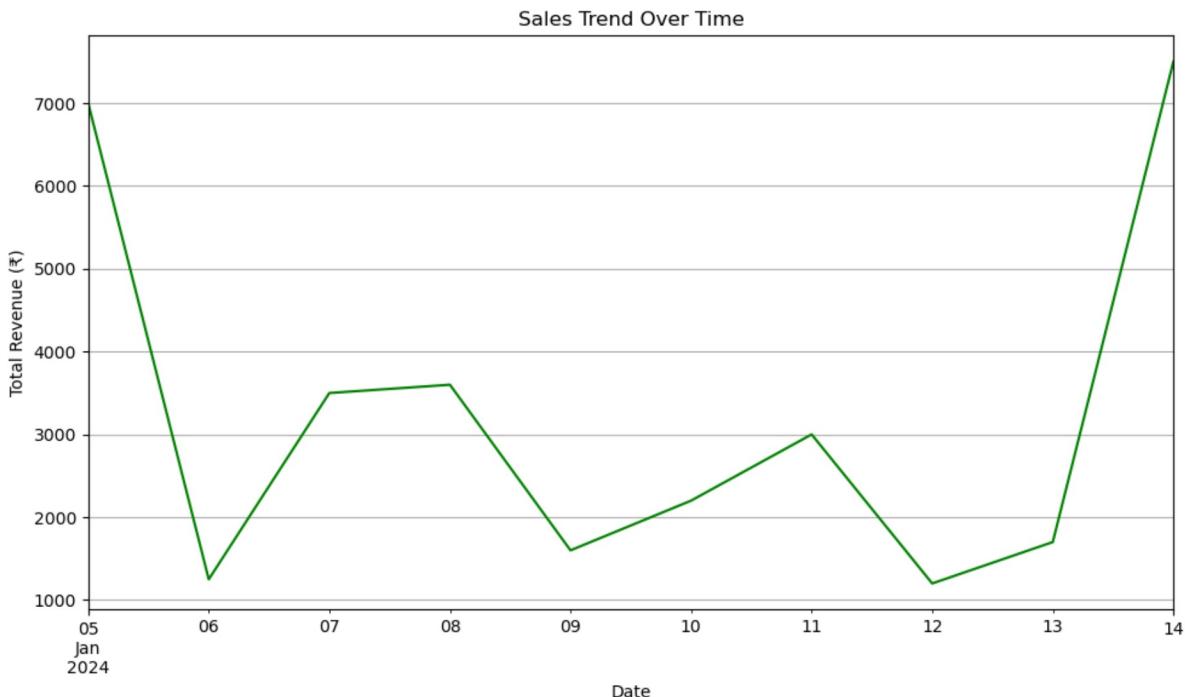
```
In [15]: branch_sales.plot(kind='bar', figsize=(8,5))
plt.title("Branch-wise Revenue & Profit")
plt.xlabel("Branch")
plt.ylabel("Amount (₹)")
plt.xticks(rotation=0)
plt.grid(axis='y')
plt.tight_layout()
plt.show()
```



```
In [16]: df['Date'] = pd.to_datetime(df['Date'])
```

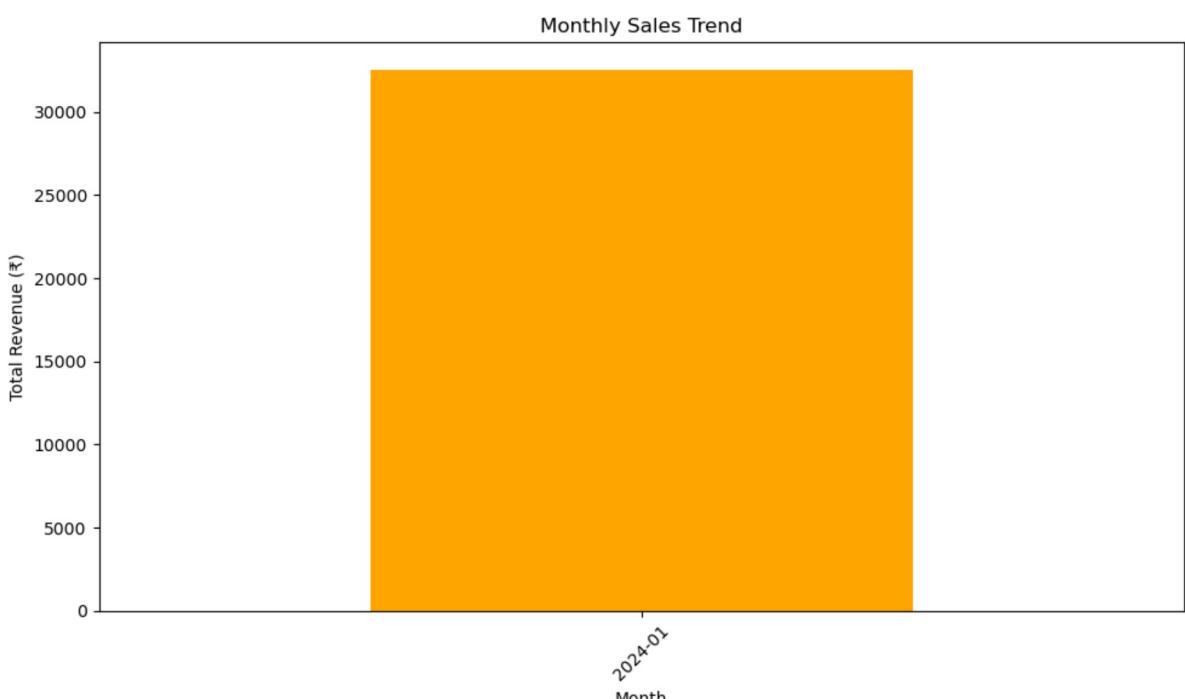
```
In [17]: # Group by Date and sum the Total Price
sales_trend = df.groupby('Date')['Total Price'].sum()

# Plotting
sales_trend.plot(kind='line', figsize=(10,6), color='green')
plt.title("Sales Trend Over Time")
plt.xlabel("Date")
plt.ylabel("Total Revenue (₹)")
plt.grid(True)
plt.tight_layout()
plt.show()
```



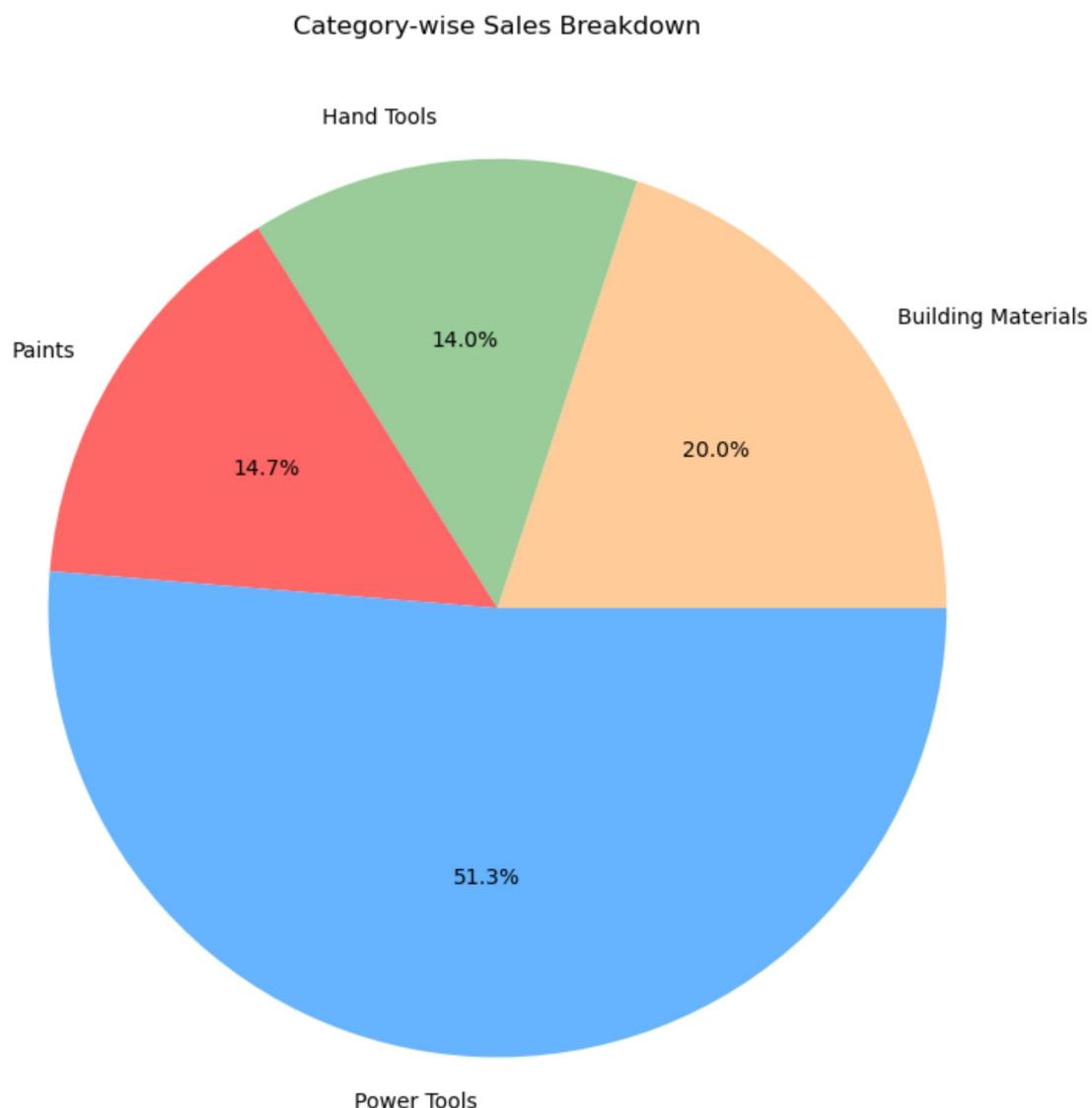
```
In [18]: # Group by month (using Date's month and year)
df['Month'] = df['Date'].dt.to_period('M')
monthly_sales = df.groupby('Month')['Total Price'].sum()

# Plotting
monthly_sales.plot(kind='bar', figsize=(10,6), color='orange')
plt.title("Monthly Sales Trend")
plt.xlabel("Month")
plt.ylabel("Total Revenue (₹)")
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```



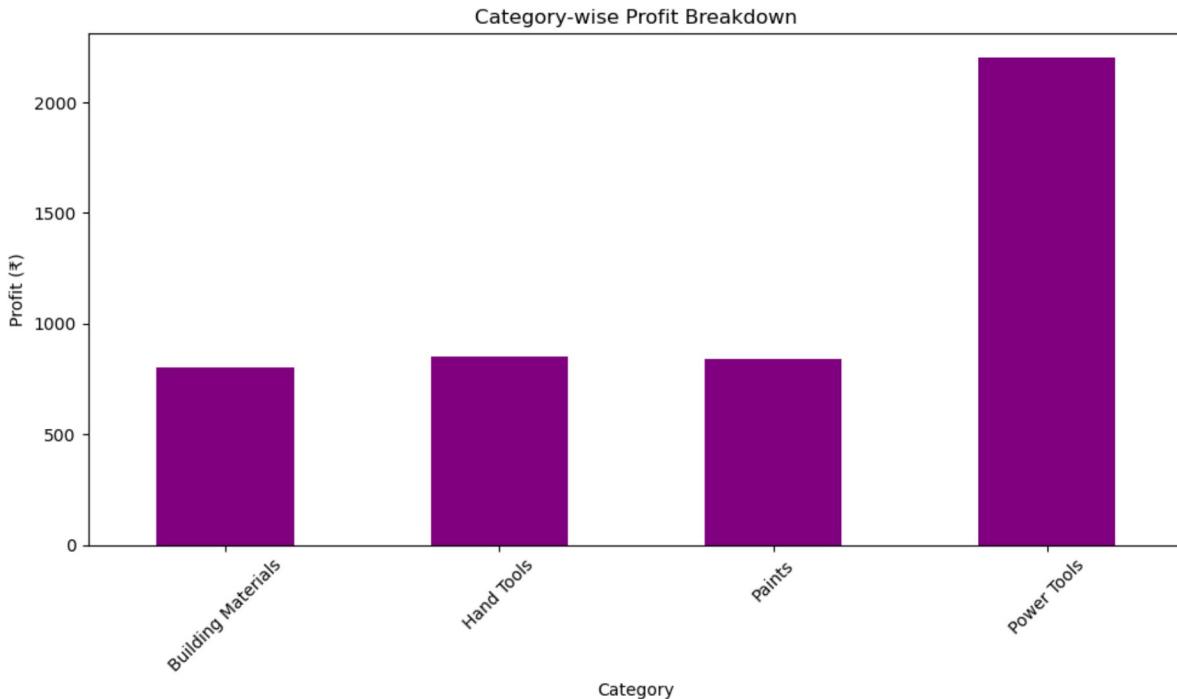
```
In [19]: category_sales = df.groupby('Category')['Total Price'].sum()

# Plotting
category_sales.plot(kind='pie', figsize=(8,8), autopct='%1.1f%%', colors=['#ffcc99',
plt.title("Category-wise Sales Breakdown")
plt.ylabel("") # Hide y-axis label
plt.tight_layout()
plt.show()
```



```
In [20]: category_profit = df.groupby('Category')['Profit'].sum()

# Plotting
category_profit.plot(kind='bar', figsize=(10,6), color='purple')
plt.title("Category-wise Profit Breakdown")
plt.xlabel("Category")
plt.ylabel("Profit (₹)")
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```



```
In [21]: top_performing_products = df.groupby('Product')['Total Price'].sum().sort_values(ascending=False)
print("Top Performing Products by Revenue:")
print(top_performing_products)
```

Top Performing Products by Revenue:

Product

Product	Total Price
Welding Machine	7500
Drill Machine	7000
Paint Bucket (10L)	3600
Cement Bag	3500
Iron Rods (Kg)	3000

Name: Total Price, dtype: int64

```
In [22]: best_branch = df.groupby('Branch')[['Total Price', 'Profit']].sum().sort_values(by='Total Price', ascending=False)
print("Best Performing Branch:")
print(best_branch)
```

Best Performing Branch:

Branch	Total Price	Profit
Delhi	21100	2700

```
In [23]: top_months = monthly_sales.sort_values(ascending=False).head(3)
print("Top 3 Months with Highest Sales:")
print(top_months)
```

Top 3 Months with Highest Sales:

Month	Total Price
2024-01	32550

Freq: M, Name: Total Price, dtype: int64

```
In [24]: category_profit = df.groupby('Category')['Profit'].sum().sort_values(ascending=False)
print("Profit by Category:")
print(category_profit)
```

Profit by Category:

```
Category
Power Tools      2200
Hand Tools       850
Paints           840
Building Materials 800
Name: Profit, dtype: int64
```

```
In [25]: category_sales_by_quantity = df.groupby('Category')['Quantity Sold'].sum().sort_values()
print("Top Categories by Quantity Sold:")
print(category_sales_by_quantity)
```

Top Categories by Quantity Sold:

```
Category
Building Materials 60
Hand Tools        11
Paints            9
Power Tools       4
Name: Quantity Sold, dtype: int64
```

```
In [26]: import matplotlib.pyplot as plt
import seaborn as sns

# Set the style for the plots
sns.set(style="whitegrid")

# Create a figure with multiple subplots
fig, ax = plt.subplots(2, 2, figsize=(15,10))

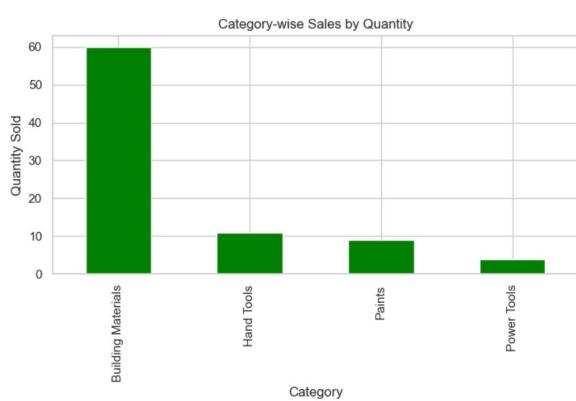
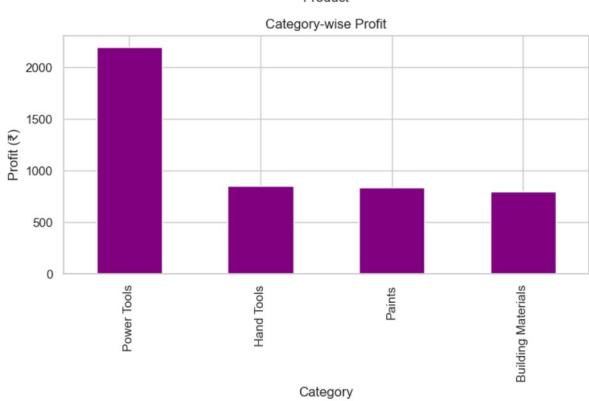
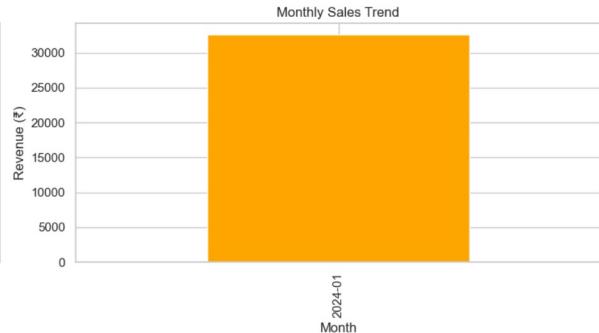
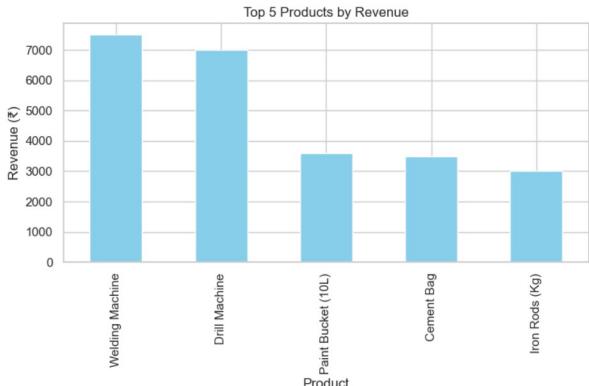
# Plot Top 5 Products by Revenue
top_products.plot(kind='bar', ax=ax[0, 0], color='skyblue', title="Top 5 Products by Revenue")
ax[0, 0].set_xlabel('Product')
ax[0, 0].set_ylabel('Revenue (₹)')

# Plot Monthly Sales Trend
monthly_sales.plot(kind='bar', ax=ax[0, 1], color='orange', title="Monthly Sales Trend")
ax[0, 1].set_xlabel('Month')
ax[0, 1].set_ylabel('Revenue (₹)')

# Plot Category-wise Profit
category_profit.plot(kind='bar', ax=ax[1, 0], color='purple', title="Category-wise Profit")
ax[1, 0].set_xlabel('Category')
ax[1, 0].set_ylabel('Profit (₹)')

# Plot Category-wise Sales (Quantity)
category_sales_by_quantity.plot(kind='bar', ax=ax[1, 1], color='green', title="Category-wise Sales (Quantity)")
ax[1, 1].set_xlabel('Category')
ax[1, 1].set_ylabel('Quantity Sold')

# Show the plots
plt.tight_layout()
plt.show()
```



In [27]: `df.to_csv("analyzed.hardware_sales.csv", index=False)`

In []: