Season Sales Data Analysis

Importing the required libraries

In [1]:
```
import pandas as pd
import numpy as np
from matplotlib import pyplot as plt
%matplotlib inline
import seaborn as sns
```

Loading the data is dataframe named df

In [2]:
```
df = pd.read_csv("Diwali Sales Data.csv", encoding = "unicode_escape")
df.head()
```

Out[2]:

	User_ID	Cust_name	Product_ID	Gender	Age Group	Age	Marital_Status	State	Zone	Occ
0	1002903	Sanskriti	P00125942	F	26-35	28	0	Maharashtra	Western	He
1	1000732	Kartik	P00110942	F	26-35	35	1	Andhra Pradesh	Southern	
2	1001990	Bindu	P00118542	F	26-35	35	1	Uttar Pradesh	Central	Aut
3	1001425	Sudevi	P00237842	M	0-17	16	0	Karnataka	Southern	Con
4	1000588	Joni	P00057942	M	26-35	28	1	Gujarat	Western	Pr

In [3]:
```
df.shape
```

Out[3]:
```
(11251, 15)
```

In [4]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 11251 entries, 0 to 11250
Data columns (total 15 columns):
 #   Column            Non-Null Count  Dtype  
---  ------            --------------  -----  
 0   User_ID           11251 non-null  int64  
 1   Cust_name         11251 non-null  object 
 2   Product_ID        11251 non-null  object 
 3   Gender            11251 non-null  object 
 4   Age Group         11251 non-null  object 
 5   Age               11251 non-null  int64  
 6   Marital_Status    11251 non-null  int64  
 7   State             11251 non-null  object 
 8   Zone              11251 non-null  object 
 9   Occupation        11251 non-null  object 
 10  Product_Category  11251 non-null  object 
 11  Orders            11251 non-null  int64  
 12  Amount            11239 non-null  float64
 13  Status            0 non-null      float64
 14  unnamed1          0 non-null      float64
dtypes: float64(3), int64(4), object(8)
memory usage: 1.3+ MB
```

Dropping the columns which are not needed for my analysis

In [5]:
```
df.drop(["Status","unnamed1"], axis = 1, inplace = True)
```

In [6]:
```
df.isnull().sum()
```

Out[6]:
```
User_ID              0
Cust_name            0
Product_ID           0
Gender               0
Age Group            0
Age                  0
Marital_Status       0
State                0
Zone                 0
Occupation           0
Product_Category     0
Orders               0
Amount              12
dtype: int64
```

In [7]:
```
df.dropna(inplace = True)
```

Changing the data type of Amount column from float to integrer

In [8]:
```
df["Amount"] = pd.to_numeric(df["Amount"], errors='coerce').astype('int64')
```

Now, lets see some descriptive statistics for the numerical variables in the dataset in hand

In [9]:
```
df.describe()
```

Out[9]:

	User_ID	Age	Marital_Status	Orders	Amount
count	1.123900e+04	11239.000000	11239.000000	11239.000000	11239.000000
mean	1.003004e+06	35.410357	0.420055	2.489634	9453.610553
std	1.716039e+03	12.753866	0.493589	1.114967	5222.355168
min	1.000001e+06	12.000000	0.000000	1.000000	188.000000
25%	1.001492e+06	27.000000	0.000000	2.000000	5443.000000
50%	1.003064e+06	33.000000	0.000000	2.000000	8109.000000
75%	1.004426e+06	43.000000	1.000000	3.000000	12675.000000
max	1.006040e+06	92.000000	1.000000	4.000000	23952.000000

In [10]:
```
df[["Age","Orders","Amount"]].describe()
```

Out[10]:

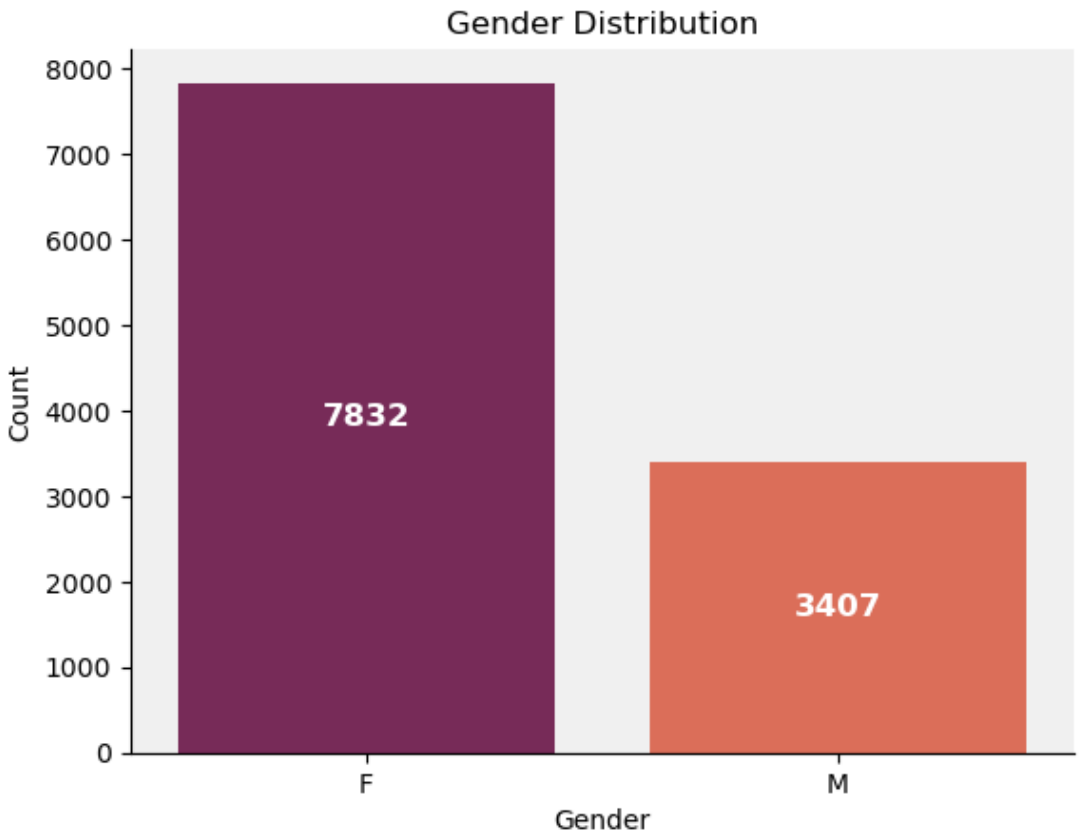
	Age	Orders	Amount
count	11239.000000	11239.000000	11239.000000
mean	35.410357	2.489634	9453.610553
std	12.753866	1.114967	5222.355168
min	12.000000	1.000000	188.000000
25%	27.000000	2.000000	5443.000000
50%	33.000000	2.000000	8109.000000
75%	43.000000	3.000000	12675.000000
max	92.000000	4.000000	23952.000000

EDA (Exploratory Data Analysis) of the data :

On basis of Gender

Plotting a bar chart for Gender and count of orders

In [11]:
```
# Creating the bar chart
ax = sns.countplot(x='Gender', data=df, palette='rocket')

# Adding data labels to the bars with custom font properties
for bars in ax.containers:
    ax.bar_label(bars, label_type='center', fontsize=12, fontweight='bold', color='white

# Setting the plot title and labels
ax.set_title('Gender Distribution')
ax.set_xlabel('Gender')
ax.set_ylabel('Count')

# Setting the background color of the plot
ax.set_facecolor('#f0f0f0')

# Removing the top and right spines
ax.spines['top'].set_visible(False)
ax.spines['right'].set_visible(False)

plt.show()
```



In [12]:
```
# Group data and calculate total amount by gender
sales_gen = df.groupby(['Gender'], as_index=False)['Amount'].sum().sort_values(by='Amoun
```

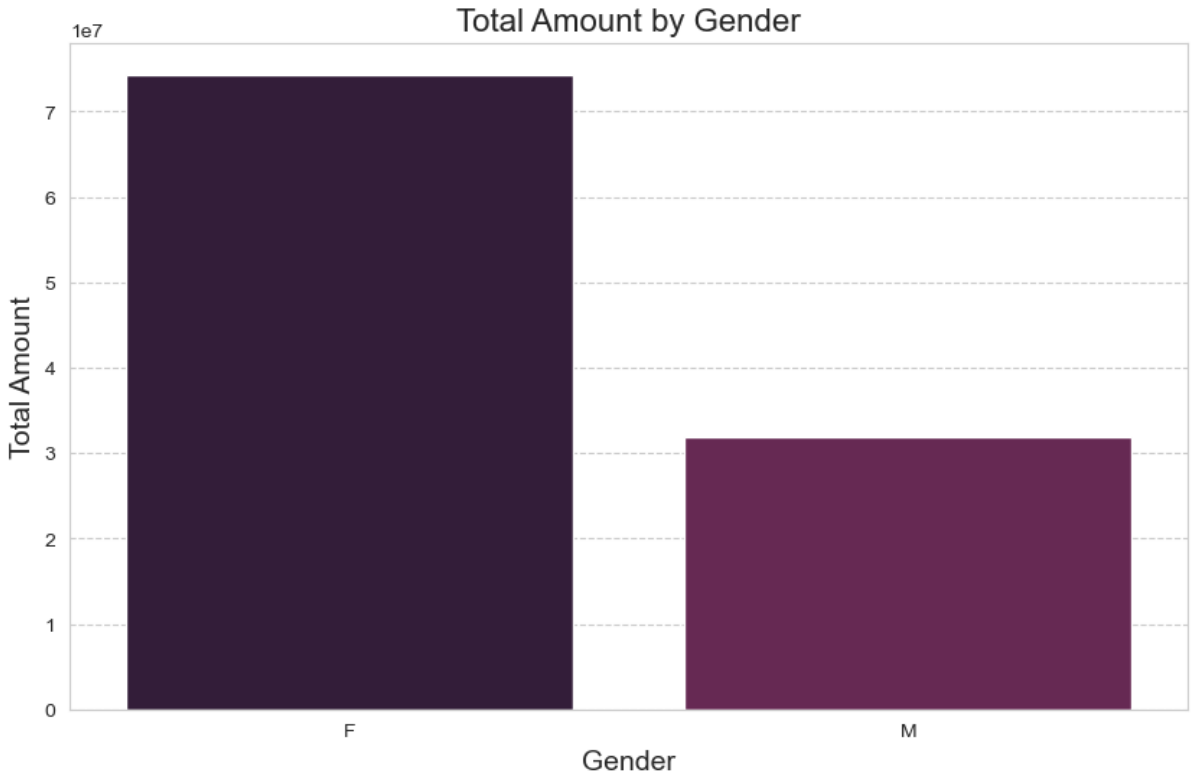
In [13]:
```
sales_gen
```

Out[13]:

	Gender	Amount
0	F	74335853
1	M	31913276

Plotting a bar chart for Gender and Amount spent of all of the orders

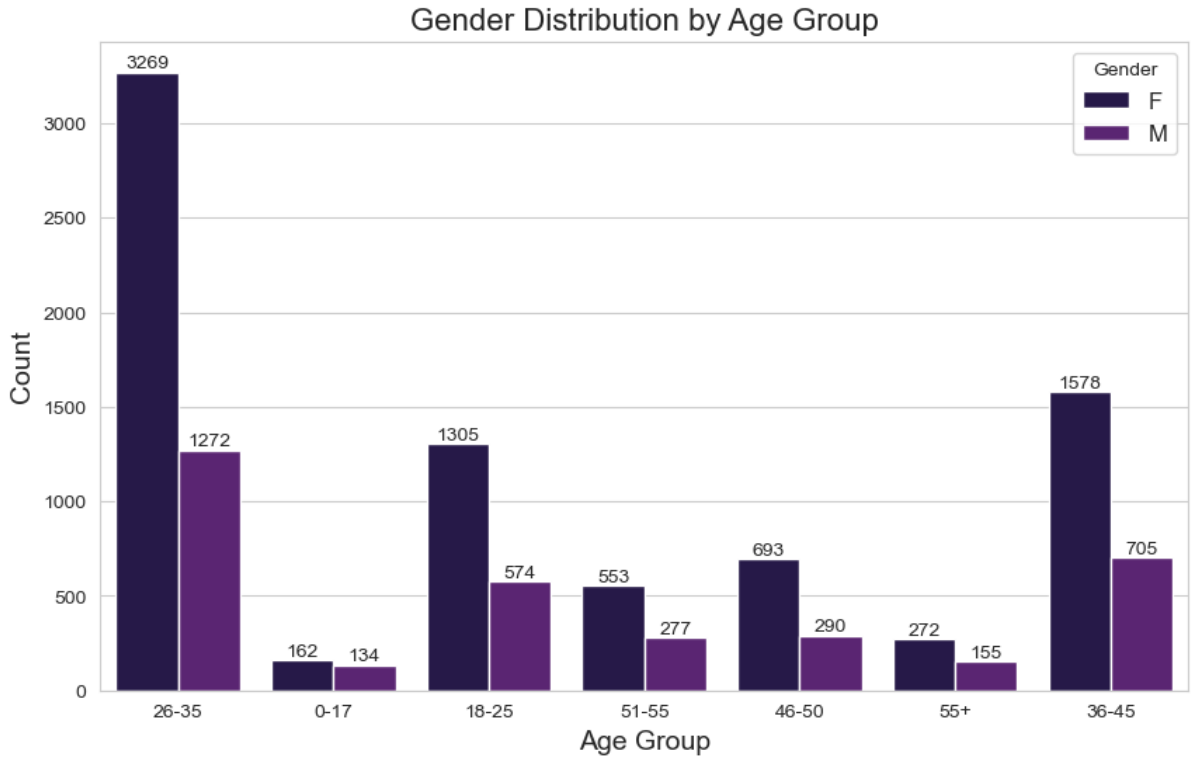
In [14]:
```
color_palette = sns.color_palette("rocket")

# Setting the seaborn style to "whitegrid"
sns.set_style("whitegrid")

# Setting up the figure and axis
plt.figure(figsize=(10, 6))
ax = sns.barplot(x='Gender', y='Amount', data=sales_gen, palette=color_palette)

# Adding labels and title
plt.xlabel("Gender", fontsize=14)
plt.ylabel("Total Amount", fontsize=14)
plt.title("Total Amount by Gender", fontsize=16)

# Adding grid lines for better readability
plt.grid(axis='y', linestyle='--', zorder = 0)

plt.show()
```



On the basis of Age

Plotting a bar chart for Age and count of orders

In [15]:
```
color_palette = sns.color_palette("magma")

# Setting up the figure and axis
plt.figure(figsize=(10, 6))
ax = sns.countplot(data=df, x='Age Group', hue='Gender', palette=color_palette)

# Adding labels and title
plt.xlabel("Age Group", fontsize=14)
plt.ylabel("Count", fontsize=14)
plt.title("Gender Distribution by Age Group", fontsize=16)

# Customizing legend and legend title
plt.legend(title="Gender", fontsize=12)

# Adding labels for the bars
for bars in ax.containers:
    ax.bar_label(bars, label_type='edge', fontsize=10)

plt.show()
```



In [16]:
```
# Total Amount vs Age Group
sales_age = df.groupby(["Age Group"], as_index=False)["Amount"].sum().sort_values(by = "
```

In [17]:
```
sales_age
```

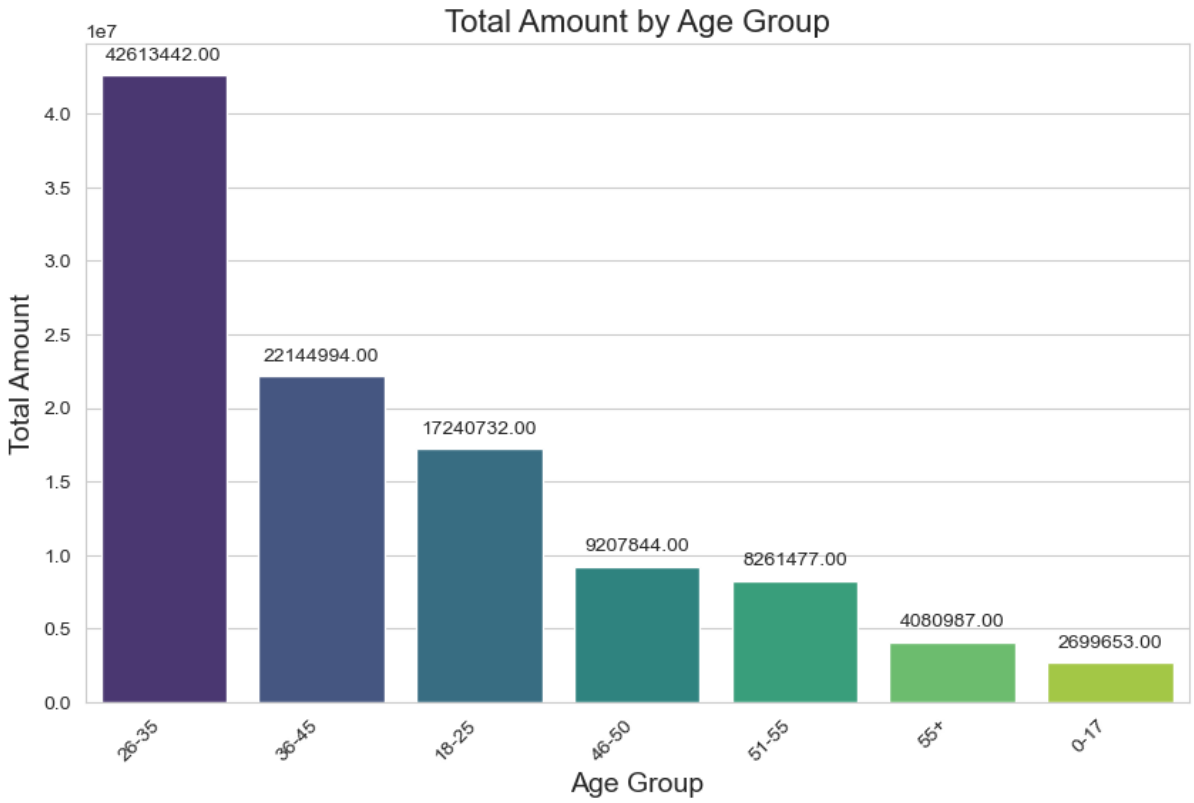
Out[17]:

	Age Group	Amount
2	26-35	42613442
3	36-45	22144994
1	18-25	17240732
4	46-50	9207844
5	51-55	8261477
6	55+	4080987
0	0-17	2699653

Plotting a bar chart for Gender and total amount spent

In [18]:
```
color_palette = sns.color_palette("viridis", n_colors=len(sales_age['Age Group']))

# Setting up the figure and axis
plt.figure(figsize=(10, 6))

# Creating the bar plot
ax = sns.barplot(x='Age Group', y='Amount', data=sales_age, palette=color_palette)

# Add data labels above each bar
for p in ax.patches:
    ax.annotate(format(p.get_height(), '.2f'), (p.get_x() + p.get_width() / 2., p.get_he
                ha='center', va='center', xytext=(0, 10), textcoords='offset points')

# Rotate x-axis labels if needed
plt.xticks(rotation=45, ha='right')

# Adding labels and title
plt.xlabel("Age Group", fontsize=14)
```

```
plt.ylabel("Total Amount", fontsize=14)
plt.title("Total Amount by Age Group", fontsize=16)

plt.show()
```



On the basis of State

In [19]:
```
# total number of orders from top 10 states

sales_state = df.groupby(['State'], as_index=False)['Orders'].sum().sort_values(by='Orde
```

In [20]:
```
sales_state
```

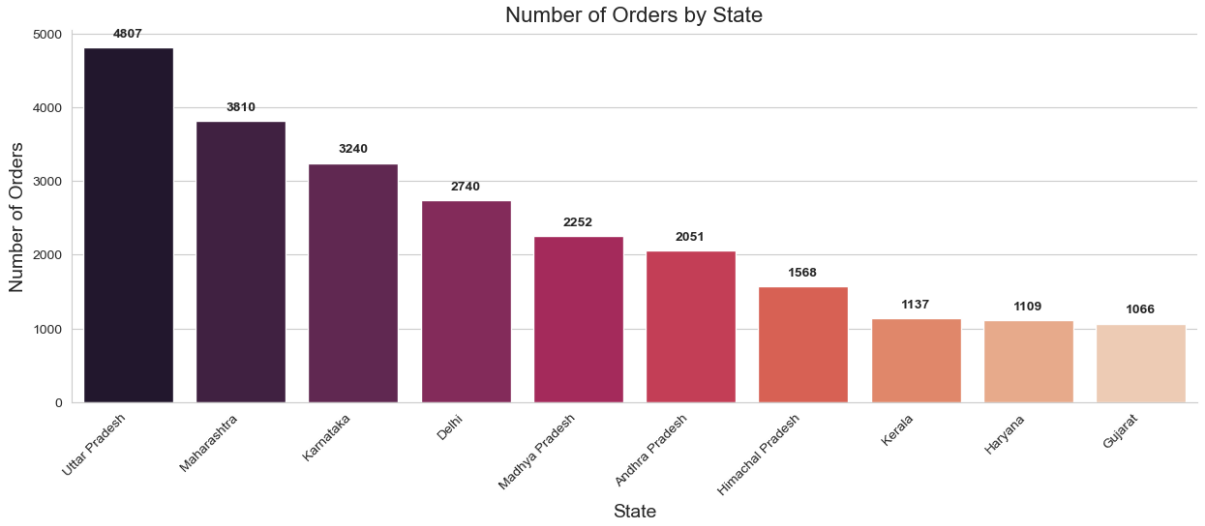
Out[20]:

	State	Orders
14	Uttar Pradesh	4807
10	Maharashtra	3810
7	Karnataka	3240
2	Delhi	2740
9	Madhya Pradesh	2252
0	Andhra Pradesh	2051
5	Himachal Pradesh	1568
8	Kerala	1137
4	Haryana	1109
3	Gujarat	1066

Plotting a bar chart for State and count of orders

In [21]:
```
color_palette = sns.color_palette("rocket", n_colors=len(sales_state["State"]))
```

```
# Sort the data by 'Orders' column in descending order
sales_state_sorted = sales_state.sort_values(by = "Orders", ascending = False)

# Setting up the figure and axis with a larger size
plt.figure(figsize=(15, 5))

# Create the bar plot
ax = sns.barplot(data = sales_state_sorted, x = "State", y = "Orders", palette = color_p

# Add data labels above each bar
for p in ax.patches:
    ax.annotate(format(p.get_height(), '.0f'), (p.get_x() + p.get_width() / 2., p.get_he
                ha = "center", va = "center", xytext = (0, 10), textcoords = "offset poi

# Rotate x-axis labels for better readability
plt.xticks(rotation = 45, ha = "right")

# Adding labels and title
plt.xlabel("State", fontsize = 14)
plt.ylabel("Number of Orders", fontsize = 14)
plt.title("Number of Orders by State", fontsize = 16)

# Remove the top and right spines
sns.despine()

plt.show()
```



In [22]:
```
# total amount/sales from top 10 states

sales_state = df.groupby(['State'], as_index=False)['Amount'].sum().sort_values(by='Amou
```

In [23]:
```
sales_state
```

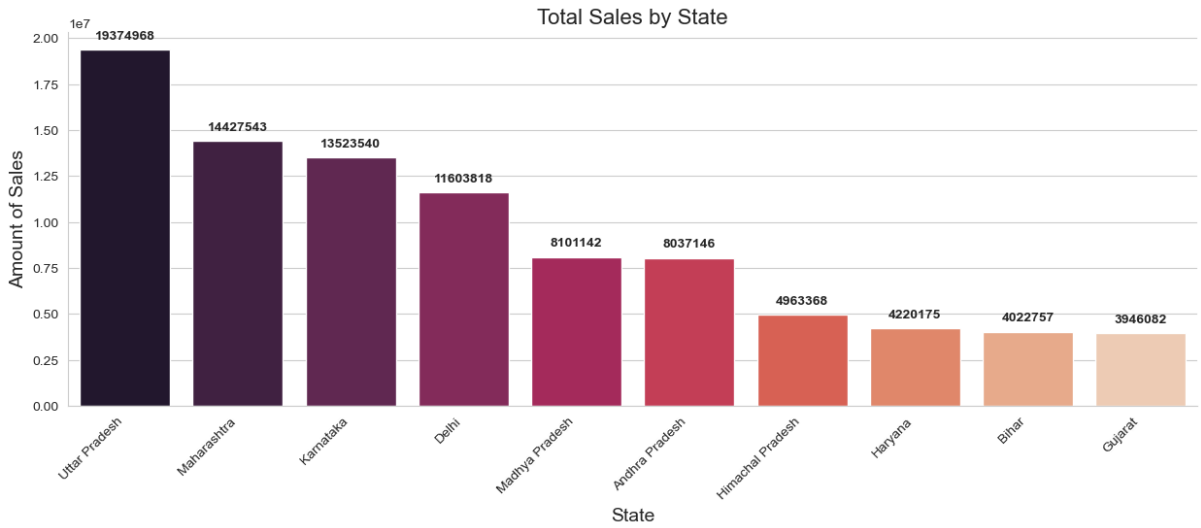
Out[23]:

	State	Amount
14	Uttar Pradesh	19374968
10	Maharashtra	14427543
7	Karnataka	13523540
2	Delhi	11603818
9	Madhya Pradesh	8101142
0	Andhra Pradesh	8037146
5	Himachal Pradesh	4963368
4	Haryana	4220175
1	Bihar	4022757
3	Gujarat	3946082

Plotting a bar chart for State and total amount of sales

In [24]:

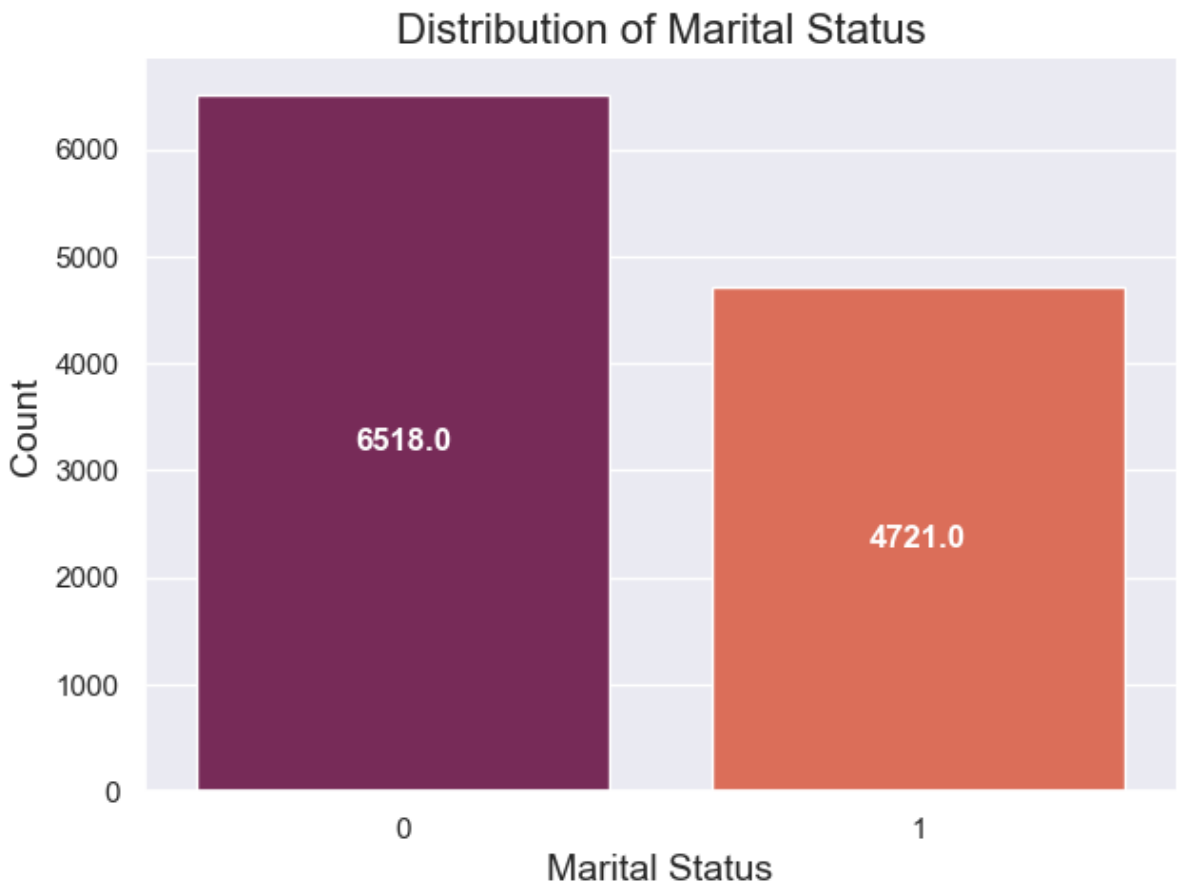
```
color_palette = sns.color_palette("rocket", n_colors=len(sales_state["State"]))

# Sort the data by 'Amount' column in descending order
sales_state_sorted = sales_state.sort_values(by="Amount", ascending=False)

# Setting up the figure and axis with a larger size
plt.figure(figsize=(15, 5))

# Create the bar plot
ax = sns.barplot(data = sales_state, x = "State", y = "Amount", palette=color_palette)

# Add data labels above each bar
for p in ax.patches:
    ax.annotate(format(p.get_height(), '.0f'), (p.get_x() + p.get_width() / 2., p.get_he
                ha = "center", va = "center", xytext = (0, 10), textcoords = "offset poi

# Rotate x-axis labels for better readability
plt.xticks(rotation = 45, ha = "right")

# Adding labels and title
plt.xlabel("State", fontsize = 14)
plt.ylabel("Amount of Sales", fontsize = 14)
plt.title("Total Sales by State", fontsize = 16)

# Remove the top and right spines
sns.despine()

plt.show()
```



On the basis of Maritial Status

Plotting a bar chart for Maritial status and count of orders

In [25]:
```
sns.set(rc={'figure.figsize': (7, 5)})

# Create the countplot with 'rocket' palette
ax = sns.countplot(data=df, x='Marital_Status', palette='rocket')

# Add centered, bold, and black data labels above each bar
for p in ax.patches:
    height = p.get_height()
    ax.text(p.get_x() + p.get_width() / 2., height / 2., f'{height}', ha='center', va='c
            fontweight='bold', color='white')

# Adding labels and title
plt.xlabel("Marital Status", fontsize=14)
plt.ylabel("Count", fontsize=14)
plt.title("Distribution of Marital Status", fontsize=16)

# Remove the top and right spines
sns.despine()

plt.show()
```



In [26]:
```
sales_state = df.groupby(['Marital_Status', 'Gender'], as_index=False)['Amount'].sum().s
```

In [27]:
```
sales_state
```

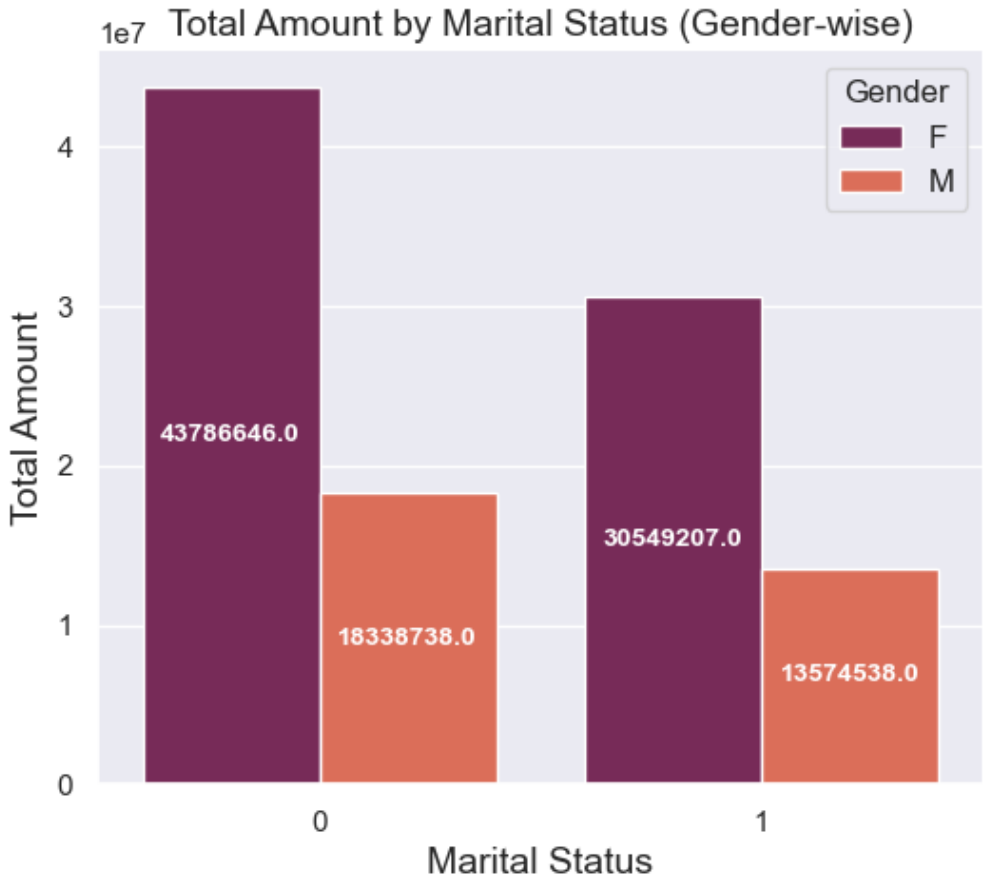
Out[27]:

	Marital_Status	Gender	Amount
0	0	F	43786646
2	1	F	30549207
1	0	M	18338738
3	1	M	13574538

Plotting a bar chart for Maritial status and total amount spent

In [28]:
```
sns.set(rc={'figure.figsize': (6, 5)})

# Creating the bar plot with hue for Gender
ax = sns.barplot(data=sales_state, x='Marital_Status', y='Amount', hue='Gender', palette

# Adding data labels in each bar
for p in ax.patches:
    height = p.get_height()
    ax.text(p.get_x() + p.get_width() / 2., height / 2., f'{height}', ha='center', va='c
            fontweight='bold', color='white')

# Adding labels and title
plt.xlabel("Marital Status", fontsize=14)
plt.ylabel("Total Amount", fontsize=14)
plt.title("Total Amount by Marital Status (Gender-wise)", fontsize=14)

# Removing the top and right spines
sns.despine()
```

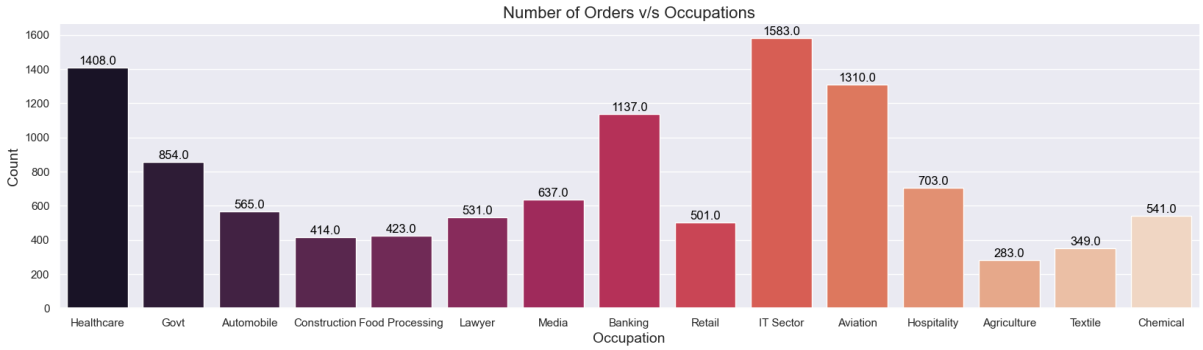
```
# Adding a legend
plt.legend(title='Gender', title_fontsize=12, fontsize=12, loc='upper right')

plt.show()
```



On the basis of Occupation

Plotting a bar chart for Occupation and count of orders

In [29]:
```
sns.set(rc={'figure.figsize': (20, 5)})

# Create the countplot with 'rocket' palette
ax = sns.countplot(data=df, x='Occupation', palette='rocket')

# Add data labels outside each bar in black color
for p in ax.patches:
    height = p.get_height()
    ax.text(p.get_x() + p.get_width() / 2., height + 5, f'{height}', ha='center', va='bo

# Adding labels and title
plt.xlabel("Occupation", fontsize=14)
plt.ylabel("Count", fontsize=14)
plt.title("Number of Orders v/s Occupations", fontsize=16)

# Remove the top and right spines
sns.despine()

plt.show()
```



In [30]:
```
sales_state = df.groupby(['Occupation'], as_index=False)['Amount'].sum().sort_values(by=
```

In [31]:
```
sales_state
```

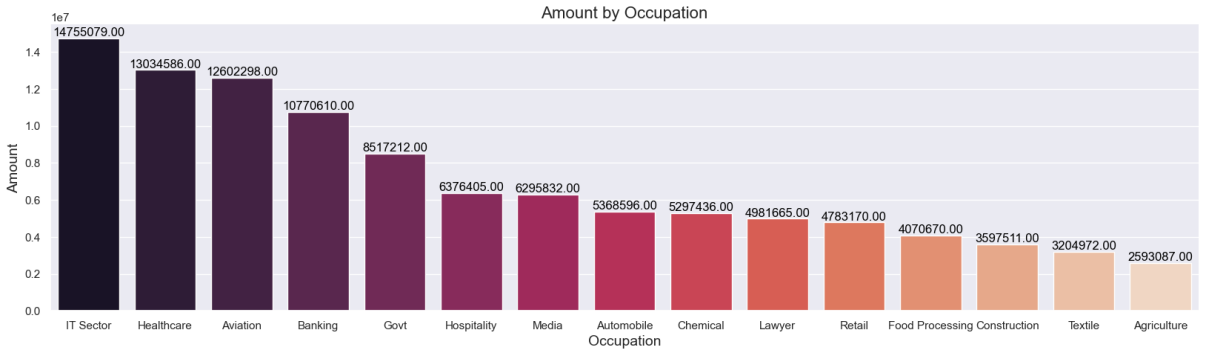
Out[31]:

	Occupation	Amount
10	IT Sector	14755079
8	Healthcare	13034586
2	Aviation	12602298
3	Banking	10770610
7	Govt	8517212
9	Hospitality	6376405
12	Media	6295832
1	Automobile	5368596
4	Chemical	5297436
11	Lawyer	4981665
13	Retail	4783170
6	Food Processing	4070670
5	Construction	3597511
14	Textile	3204972
0	Agriculture	2593087

Plotting a bar chart for Occupation and total amount spent

In [32]:
```
sns.set(rc={'figure.figsize': (20, 5)})

# Create the bar plot with 'rocket' palette
ax = sns.barplot(data=sales_state, x='Occupation', y='Amount', palette='rocket')

# Add data labels outside each bar in black color
for p in ax.patches:
    height = p.get_height()
    ax.text(p.get_x() + p.get_width() / 2., height + 5, f'{height:.2f}', ha='center', va

# Adding labels and title
plt.xlabel("Occupation", fontsize=14)
plt.ylabel("Amount", fontsize=14)
plt.title("Amount by Occupation", fontsize=16)

# Remove the top and right spines
sns.despine()
```

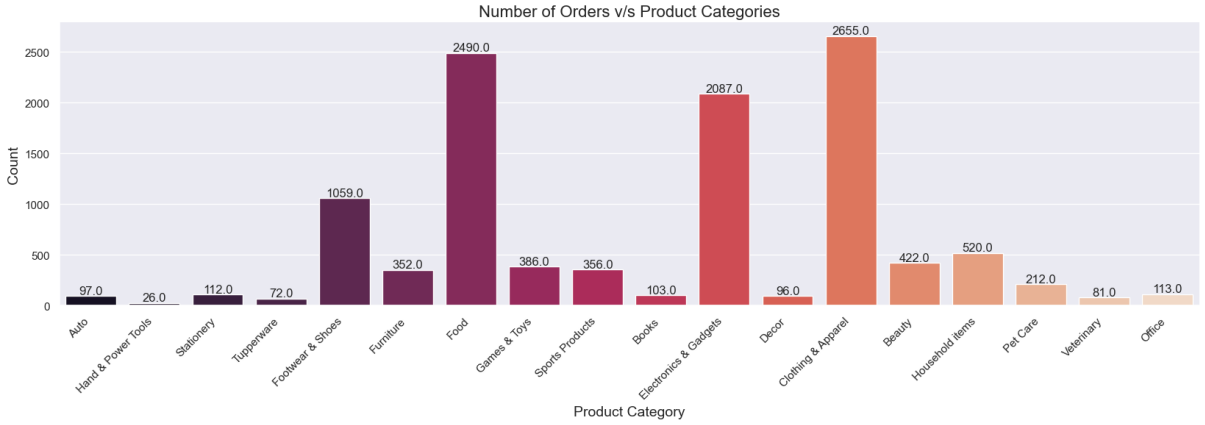
```
plt.show()
```



On the basis of Product Category

Plotting a bar chart for Product Category and count of orders

In [33]:
```
sns.set(rc={'figure.figsize': (20, 5)})

# Create the countplot with 'rocket' palette
ax = sns.countplot(data=df, x='Product_Category', palette='rocket')

# Add data labels above each bar with count values
for p in ax.patches:
    height = p.get_height()
    ax.annotate(f'{height}', (p.get_x() + p.get_width() / 2., height),
                ha='center', va='center', xytext=(0, 5), textcoords='offset points', for

# Rotate x-axis labels for better readability
plt.xticks(rotation=45, ha='right')

# Adding labels and title
plt.xlabel("Product Category", fontsize=14)
plt.ylabel("Count", fontsize=14)
plt.title("Number of Orders v/s Product Categories", fontsize=16)

# Remove the top and right spines
sns.despine()

plt.show()
```



In [34]:
```
sales_state = df.groupby(['Product_Category'], as_index=False)['Amount'].sum().sort_valu
```

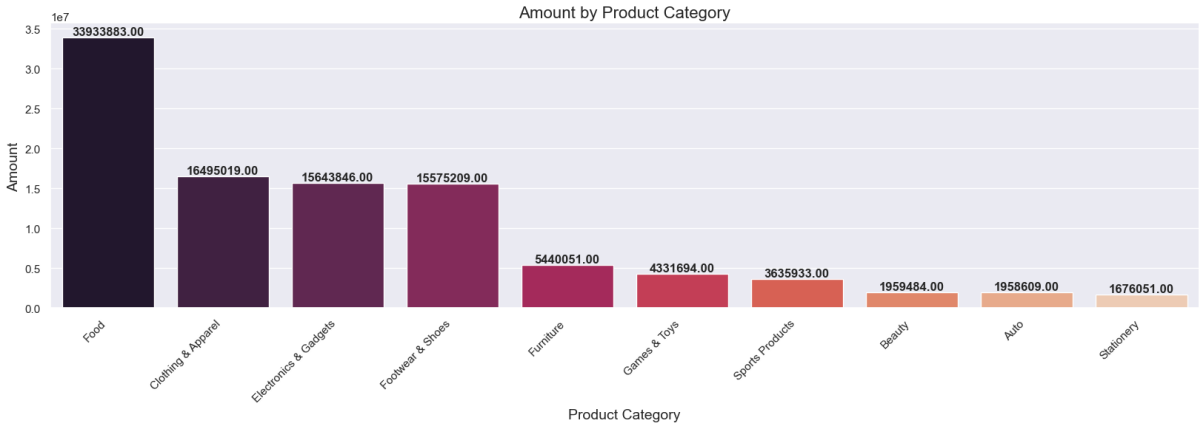
In [35]:
```
sales_state
```

Out[35]:

	Product_Category	Amount
6	Food	33933883
3	Clothing & Apparel	16495019
5	Electronics & Gadgets	15643846
7	Footwear & Shoes	15575209
8	Furniture	5440051
9	Games & Toys	4331694
14	Sports Products	3635933
1	Beauty	1959484
0	Auto	1958609
15	Stationery	1676051

Plotting a bar chart for Product Category andtotal amount spent

In [36]:
```
sns.set(rc={'figure.figsize': (20, 5)})

# Create the bar plot with 'rocket' palette
ax = sns.barplot(data=sales_state, x='Product_Category', y='Amount', palette='rocket')

# Customize x-axis labels for better readability
plt.xticks(rotation=45, ha='right')

# Adding data labels above each bar
for p in ax.patches:
    height = p.get_height()
    ax.annotate(f'{height:.2f}', (p.get_x() + p.get_width() / 2., height),
                ha='center', va='bottom', fontsize=12, weight = "bold")

# Adding labels and title
plt.xlabel("Product Category", fontsize=14)
plt.ylabel("Amount", fontsize=14)
plt.title("Amount by Product Category", fontsize=16)

# Remove the top and right spines
sns.despine()

plt.show()
```



On the basis of Product ID

In [37]:
```
sales_state = df.groupby(['Product_ID'], as_index=False)['Orders'].sum().sort_values(by=
```

In [38]:
```
sales_state
```

Out[38]:

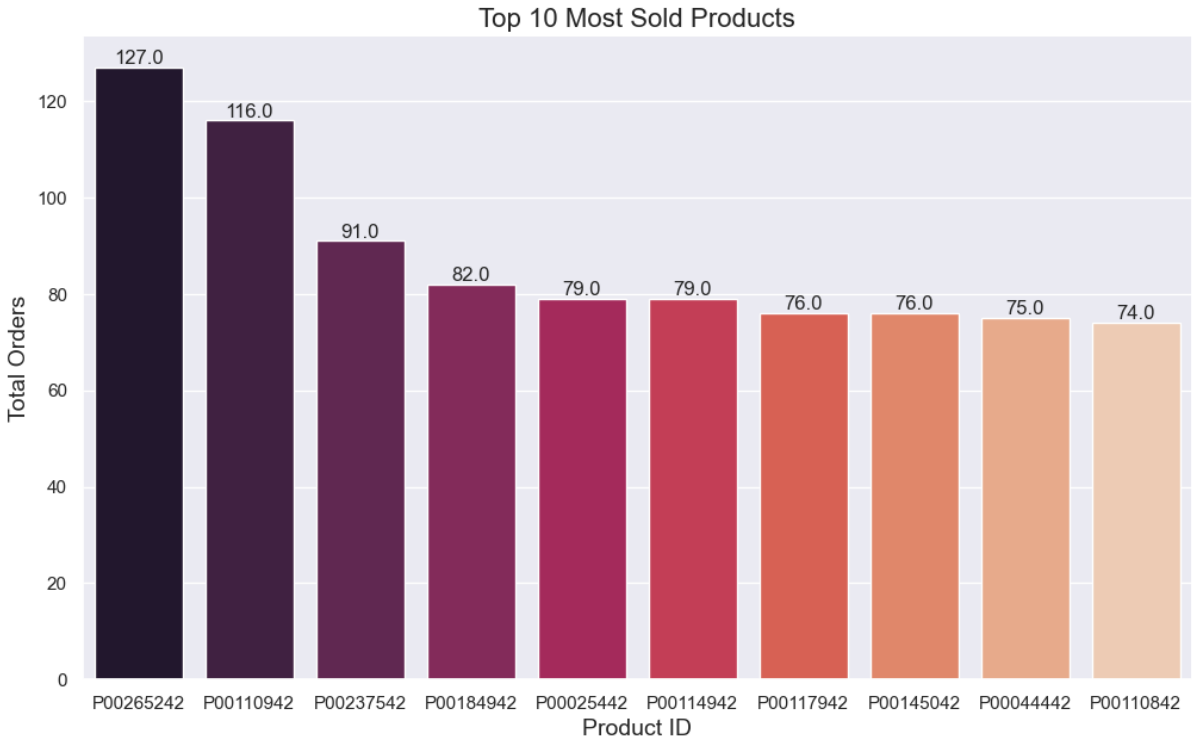
	Product_ID	Orders
1679	P00265242	127
644	P00110942	116
1504	P00237542	91
1146	P00184942	82
679	P00114942	79
171	P00025442	79
708	P00117942	76
888	P00145042	76
298	P00044442	75
643	P00110842	74

Plotting a bar chart for Product ID and count of orders

In [39]:
```
sns.set(rc={'figure.figsize': (20, 5)})

# Create the bar plot with 'rocket' palette
ax = sns.barplot(data=sales_state, x='Product_ID', y='Orders', palette='rocket')

# Customize x-axis labels for better readability
plt.xticks(rotation=45, ha='right')

# Adding data labels above each bar
for p in ax.patches:
    height = p.get_height()
    ax.annotate(f'{height}', (p.get_x() + p.get_width() / 2., height),
                ha='center', va='bottom', fontsize=12, weight = "bold")

# Adding labels and title
plt.xlabel("Product ID", fontsize=14)
plt.ylabel("Orders", fontsize=14)
plt.title("Orders by Product ID", fontsize=16)

# Remove the top and right spines
sns.despine()

plt.show()
```

In [40]:
```
top_10_products = df.groupby('Product_ID')['Orders'].sum().nlargest(10).sort_values(asce

# Setting the seaborn style and figure size
sns.set(rc={'figure.figsize': (12, 7)})
```

```
# Create the bar plot with 'rocket' palette
ax = sns.barplot(x=top_10_products.index, y=top_10_products.values, palette='rocket')

# Adding data labels above each bar
for p in ax.patches:
    height = p.get_height()
    ax.annotate(f'{height}', (p.get_x() + p.get_width() / 2., height),
                ha='center', va='bottom', fontsize=12)

# Adding labels and title
plt.xlabel("Product ID", fontsize=14)
plt.ylabel("Total Orders", fontsize=14)
plt.title("Top 10 Most Sold Products", fontsize=16)

# Remove the top and right spines
sns.despine()

plt.show()
```



Conclusion :

Married women aged between 26-35 years working in IT, Healthcare, and Aviation sectors, residing in Uttar Pradesh, Maharashtra, and Karnataka, show a higher likelihood of purchasing products from the Food, Clothing, and Electronics categories.