In [1]:
```
import pandas as pd
import numpy as np
import seaborn as ssb
import matplotlib.pyplot as plt
```

In [2]:
```
df = pd.read_csv("C:\\Users\\RD\\Desktop\\Diwali Sales Data.csv", encoding = "unicode_
```

In [3]:
```
df.head(10)
```

Out[3]:

	User_ID	Cust_name	Product_ID	Gender	Age Group	Age	Marital_Status	State	Zone
0	1002903	Sanskriti	P00125942	F	26-35	28	0	Maharashtra	Western
1	1000732	Kartik	P00110942	F	26-35	35	1	Andhra Pradesh	Southern
2	1001990	Bindu222	P00118542	female	26-35	35	1	Uttar Pradesh	Central
3	1001425	Sudevi	P00237842	M	0-17	16	0	Karnataka	Southern
4	1000588	Joni	P00057942	M	26-35	28	1	Gujarat	Western
5	1000588	Joni	P00057942	M	26-35	28	1	Himachal Pradesh	Northern
6	1001132	.//Balk	P00018042	F	18-25	25	1	Uttar Pradesh	Central
7	1002092	Shivangi	P00273442	F	55+	61	0	Maharashtra	Western
8	1003224	Kushal/	P00205642	M	26-35	35	0	Uttar Pradesh	Central
9	1003650	Ginny	P00031142	F	26-35	26	1	Andhra Pradesh	Southern

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   job               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
```

In [5]:
```
# After analyz that no need of 'int64' integer in dataframe that is consume more space
# I converte it into 'int32'.
```

In [6]:
```
for i in df.columns:
    if df[i].dtype == "int64":
        df[i] = df[i].astype('int32')


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  int32  
 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  int32  
 6   Marital_Status    11251 non-null  int32  
 7   State             11251 non-null  object 
 8   Zone              11251 non-null  object 
 9   job               11251 non-null  object 
 10  Product_Category  11251 non-null  object 
 11  Orders            11251 non-null  int32  
 12  Amount            11239 non-null  float64
 13  Status            0 non-null      float64
 14  unnamed1          0 non-null      float64
dtypes: float64(3), int32(4), object(8)
memory usage: 1.1+ MB
```

In [7]:
```
# We ignored the Amount Column for change the dtype bcos it has null values .
# If we try performe dtype change operation over null values it will throw errors .
```

Drop extra columns and rename column

In [8]:
```
# use drop function

df = df.drop(['Status','unnamed1'],axis = 1)

# remane job column name in occupation

df = df.rename(columns = {'job':'Occupation'})

df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 11251 entries, 0 to 11250
Data columns (total 13 columns):
 #   Column            Non-Null Count  Dtype  
---  ------            --------------  -----  
 0   User_ID           11251 non-null  int32  
 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  int32  
 6   Marital_Status    11251 non-null  int32  
 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  int32  
 12  Amount            11239 non-null  float64
dtypes: float64(1), int32(4), object(8)
memory usage: 967.0+ KB
```

In [9]:
```
# I use drop function and pass list of column to delete those (Status, unnamed1 ) from
# Now data look clean through looking info() function
```

Looking for null values

In [10]:
```
df.isnull().sum()
```

Out[10]:
```
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 [11]:
```
# find percentage of null value present in dataset
```

In [12]:
```
round(df.isnull().sum()/len(df)*100,2)
```

Out[12]:
```
User_ID             0.00
Cust_name           0.00
Product_ID          0.00
Gender              0.00
Age Group           0.00
Age                 0.00
Marital_Status      0.00
State               0.00
Zone                0.00
Occupation          0.00
Product_Category    0.00
Orders              0.00
Amount              0.11
dtype: float64
```

In [13]:
```
# Found that .11% values are null in amount column of total values present .
# So there no need to impute values with mean/mode/median .
# if the percentage of null value 5% < null and null > 40% then it will be necessary t
```

Drop null values

In [14]:
```
df = df.dropna()
pd.isnull(df).sum()
```

Out[14]:
```
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              0
dtype: int64
```

In [15]:
```
# now no null values present in dataset
```

change amount dtype

In [16]:
```
# change data type
df['Amount'] = df['Amount'].astype('int32')
df['Amount'].dtypes
```

Out[16]:
```
dtype('int32')
```

Drop duplicate values

In [17]:
```
df.duplicated().sum()
```

Out[17]:
```
8
```

In [18]:
```
df = df.drop_duplicates()

# Final check of duplicate values
df.duplicated().sum()
```

Out[18]:
```
0
```

In [19]:
```
# I used drop_duplicates method to remove duplicate value present in dataset .
```

Unique values

In [20]:
```
df.nunique()
```

Out[20]:
```
User_ID             3752
Cust_name           1252
Product_ID          2350
Gender                 4
Age Group              7
Age                   81
Marital_Status         2
State                 16
Zone                   5
Occupation            15
Product_Category      18
Orders                 4
Amount              6583
dtype: int64
```

In [21]:
```
# with observation I found four type of gender in Gender column . There is need to che
```

In [22]:
```
df['Gender'].unique()
```

Out[22]:
```
array(['F', 'female', 'M', 'male'], dtype=object)
```

In [23]:
```
# Now there is need to replace female and male into F,M respectively .
```

Replace values

In [24]:
```
# In Gender column some rows contain "female" instide of "F"  and "male" instide of "M

df[df['Gender'].isin(['male','female'])]
```

Out[24]:

	User_ID	Cust_name	Product_ID	Gender	Age Group	Age	Marital_Status	State	Zone
2	1001990	Bindu222	P00118542	female	26-35	35	1	Uttar Pradesh	Central
13	1001680	Vasudev	P00324942	male	26-35	26	1	Andhra Pradesh	Southern
39	1003111	Dean	P00249542	female	18-25	25	1	Andhra Pradesh	Southern
40	1000687	Neola	P00156442	male	26-35	35	0	Kerala	Southern

In [25]:
```
# With the help of replace fuction we replace all male and female with M and F.

df['Gender']=df['Gender'].replace({'male':'M','female':'F'})

df['Gender'].isin(['male','female']).sum()
```

Out[25]:
```
0
```

Use of strip function

In [26]:
```
# After looking Cust_name column found some extra space and unwanted number and alphab
# To remove them use strip method .
```

In [27]:
```
df['Cust_name'].head(10)
```

Out[27]:
```
0     Sanskriti
1        Kartik
2      Bindu222
3        Sudevi
4          Joni
5          Joni
6       .//Balk
8       Kushal/
9         Ginny
10     Harshita
Name: Cust_name, dtype: object
```

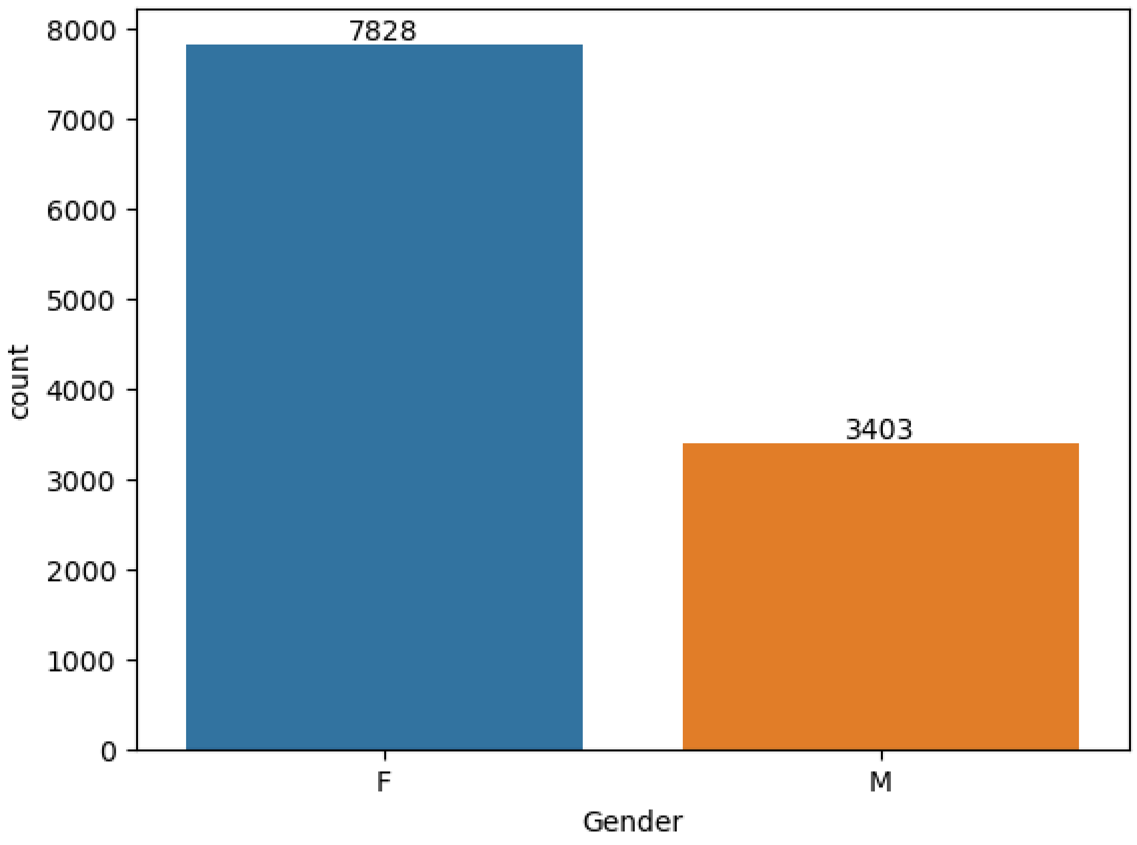
In [28]:
```
ac = df['Cust_name'].str.strip('./123')

# Final check

ac.head(10)
```

Out[28]:
```
0     Sanskriti
1        Kartik
2         Bindu
3        Sudevi
4          Joni
5          Joni
6          Balk
8        Kushal
9         Ginny
10     Harshita
Name: Cust_name, dtype: object
```

Exploratory Data Analysis

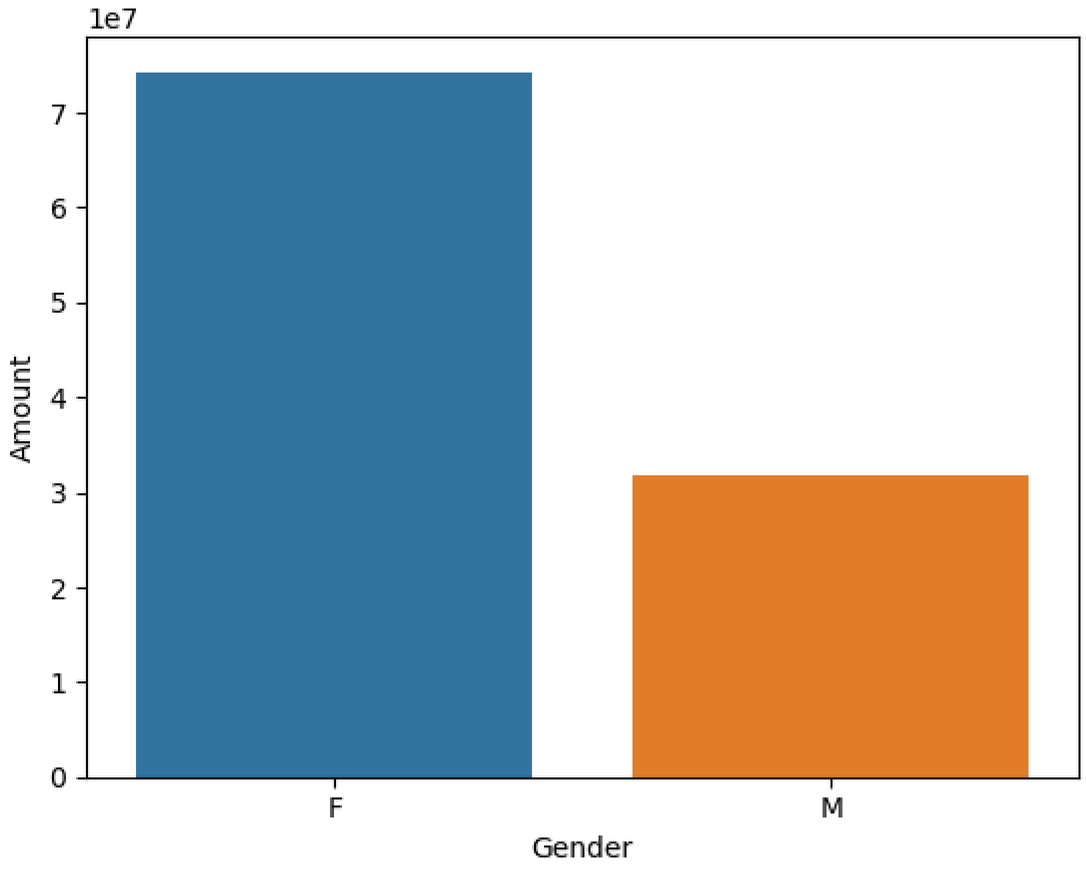
Gender

In [30]:
```
# plotting a bar chart for Gender and it's count

ax = ssb.countplot(x = 'Gender',data = df)

for bars in ax.containers:
    ax.bar_label(bars)
```



In [31]:
```
# plotting a bar chart for gender vs total amount

sales_gen = df.groupby(['Gender'], as_index=False)['Amount'].sum().sort_values(by='Amo

ssb.barplot(x = 'Gender',y= 'Amount' ,data = sales_gen)
```

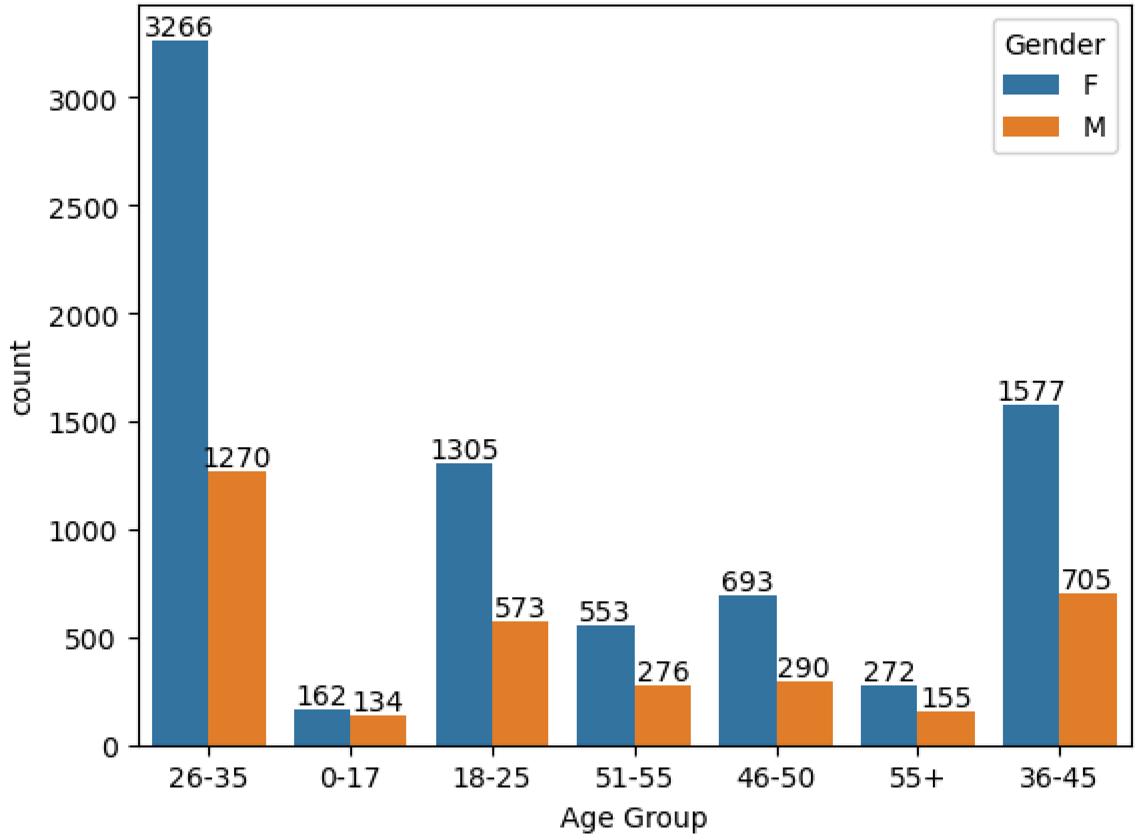
Out[31]:
```
<Axes: xlabel='Gender', ylabel='Amount'>
```



From above graphs we can see that most of the buyers are females and even the purchasing power of females are greater than men

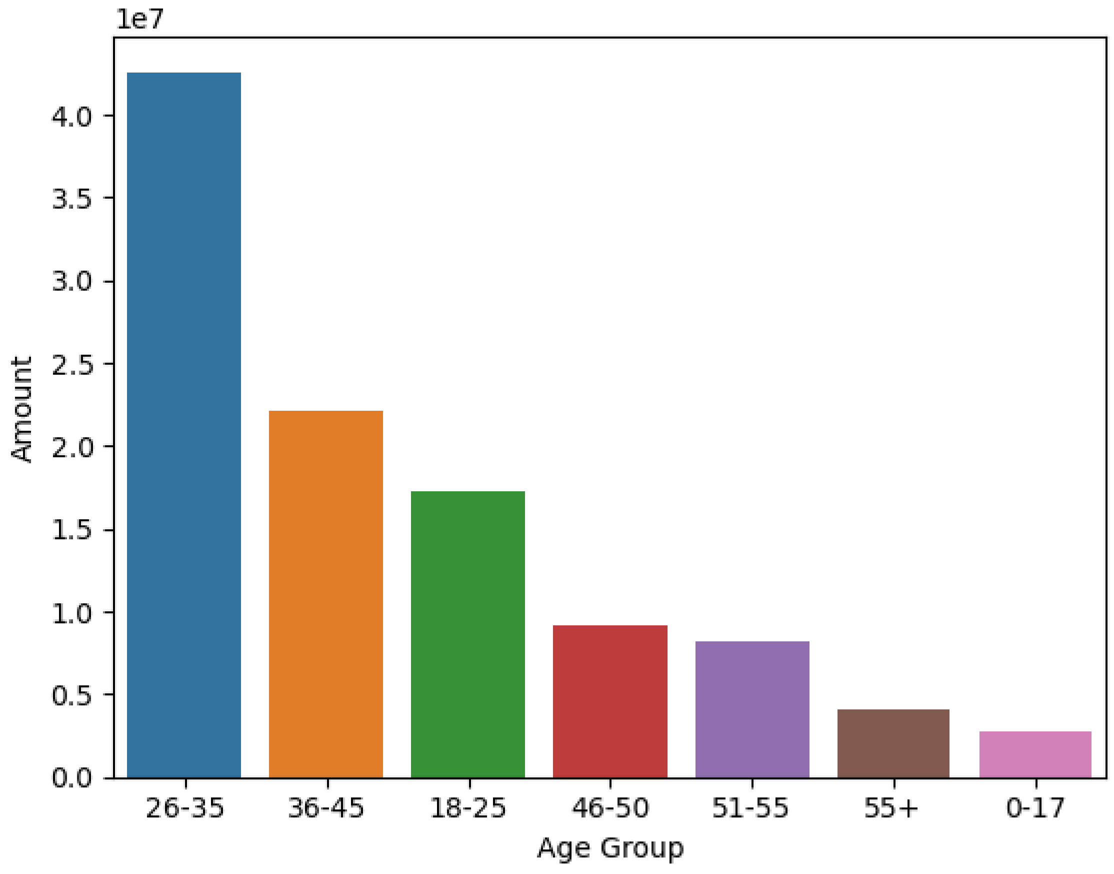
Age

```
In [35]: ax = ssb.countplot(data = df, x = 'Age Group', hue = 'Gender')

         for bars in ax.containers:
             ax.bar_label(bars)
```



In [37]:
```
# Total Amount vs Age Group
sales_age = df.groupby(['Age Group'], as_index=False)['Amount'].sum().sort_values(by='

ssb.barplot(x = 'Age Group',y= 'Amount' ,data = sales_age)
```

Out[37]:
```
<Axes: xlabel='Age Group', ylabel='Amount'>
```

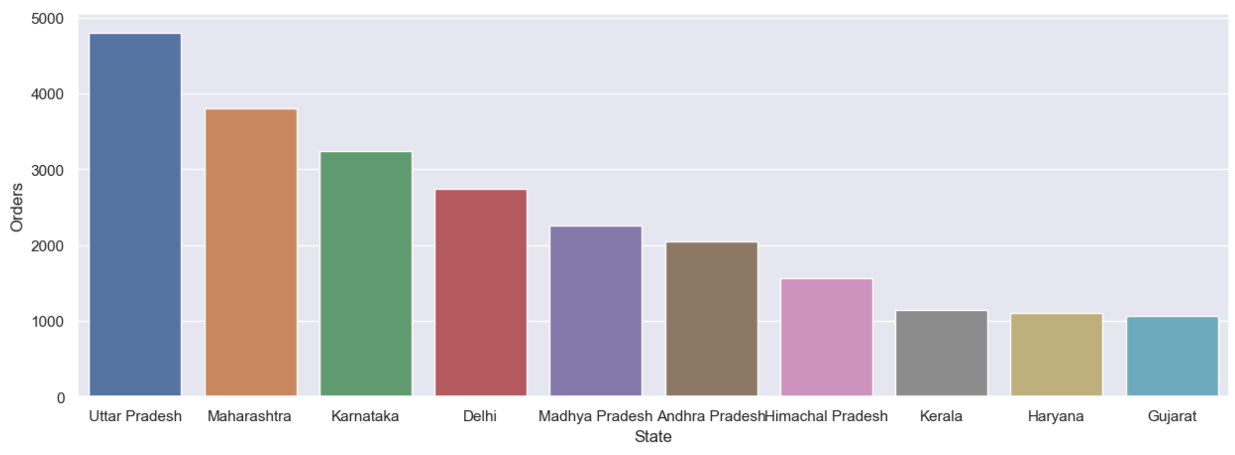


From above graphs we can see that most of the buyers are of age group between 26-35 yrs female

Store

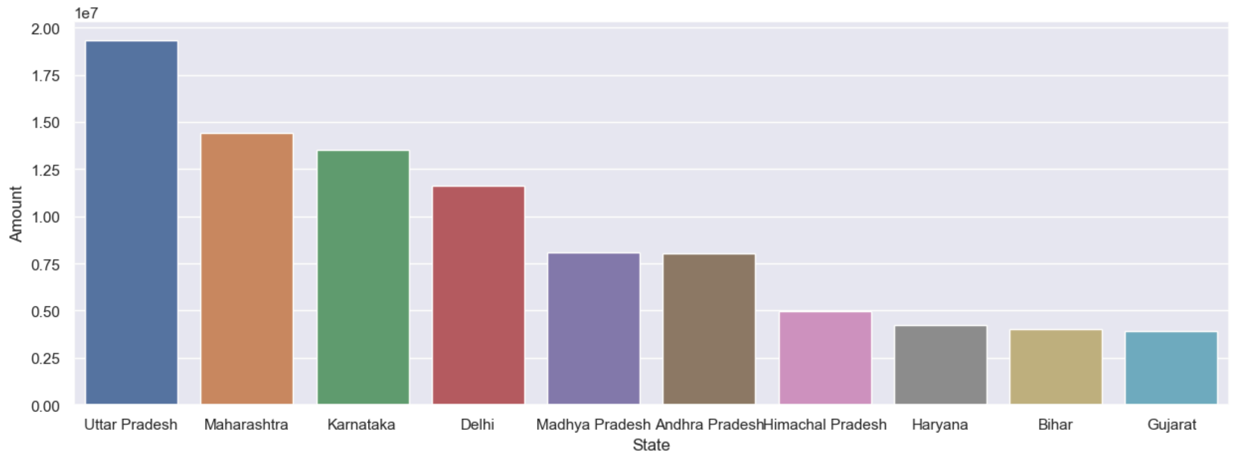
In [38]:
```
# total number of orders from top 10 states

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

ssb.set(rc={'figure.figsize':(15,5)})
ssb.barplot(data = sales_state, x = 'State',y= 'Orders')
```

Out[38]:
```
<Axes: xlabel='State', ylabel='Orders'>
```



In [40]:
```
# total amount/sales from top 10 states

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

ssb.set(rc={'figure.figsize':(15,5)})
ssb.barplot(data = sales_state, x = 'State',y= 'Amount')
```

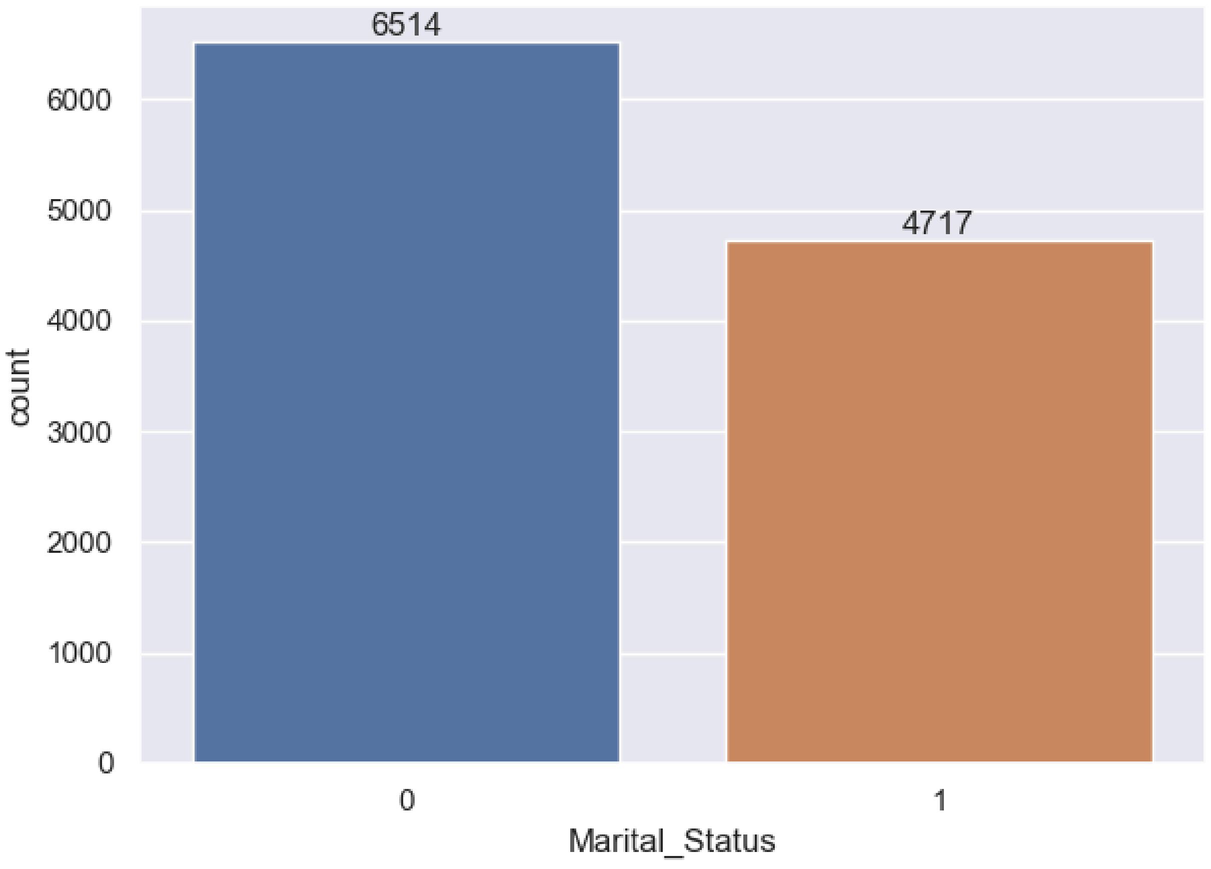
Out[40]:
```
<Axes: xlabel='State', ylabel='Amount'>
```



From above graphs we can see that most of the orders & total sales/amount are from Uttar Pradesh, Maharashtra and Karnataka respectively

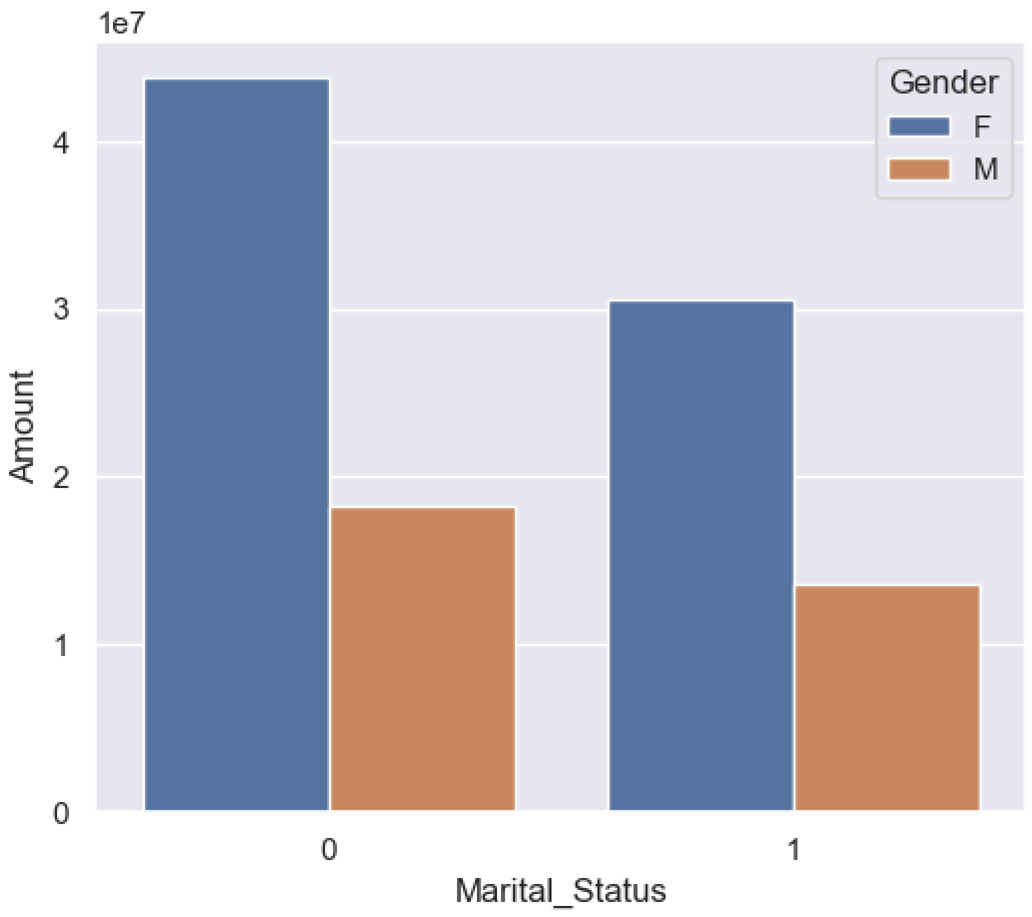
Marital Status

In [47]:
```
ax = ssb.countplot(data = df, x = 'Marital_Status')

ssb.set(rc={'figure.figsize':(7,3)})
for bars in ax.containers:
    ax.bar_label(bars)
```



```
In [53]: sales_state = df.groupby(['Marital_Status', 'Gender'], as_index=False)['Amount'].sum()

         ssb.set(rc={'figure.figsize':(6,5)})
         ssb.barplot(data = sales_state, x = 'Marital_Status',y= 'Amount', hue='Gender')
```

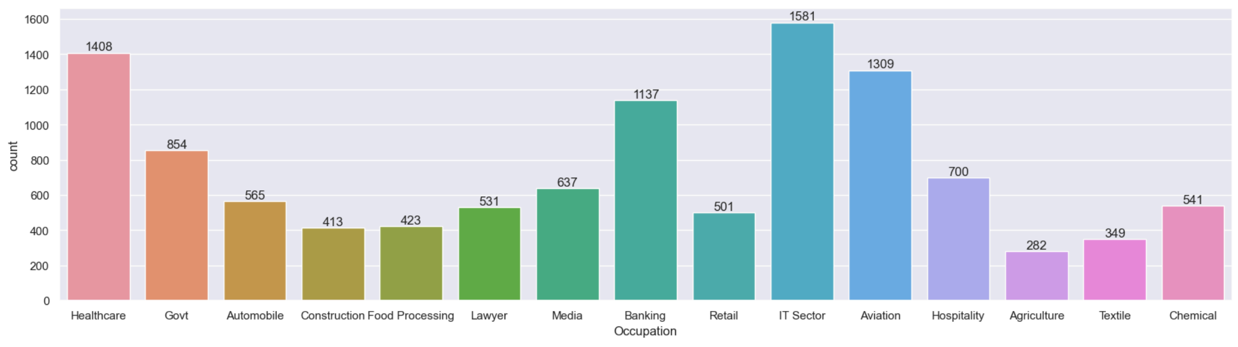
```
Out[53]: <Axes: xlabel='Marital_Status', ylabel='Amount'>
```



From above graphs we can see that most of the buyers are married (women) and they have high purchasing power

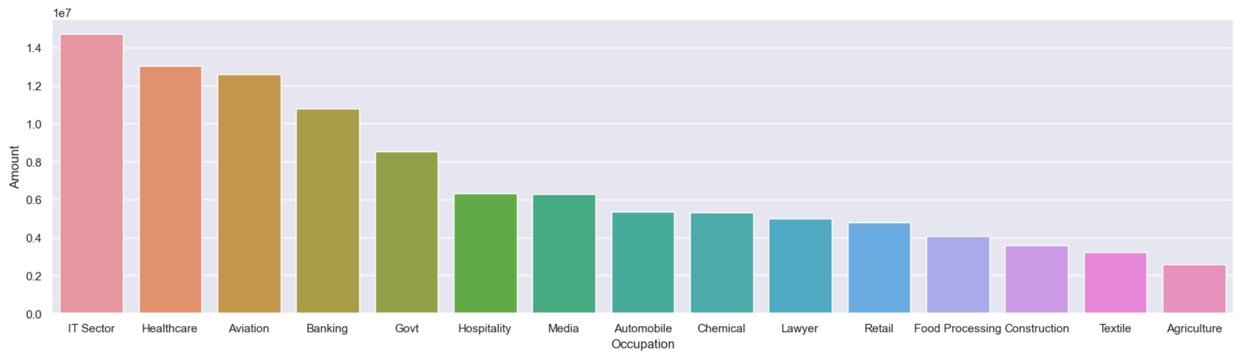
Occupation

In [51]:
```
ssb.set(rc={'figure.figsize':(20,5)})
ax = ssb.countplot(data = df, x = 'Occupation
for bars in ax.containers:
    ax.bar_label(bars)
```



In [55]:
```
sales_state = df.groupby(['Occupation'], as_index=False)['Amount'].sum().sort_values(b

ssb.set(rc={'figure.figsize':(20,5)})
ssb.barplot(data = sales_state, x = 'Occupation',y= 'Amount')
```

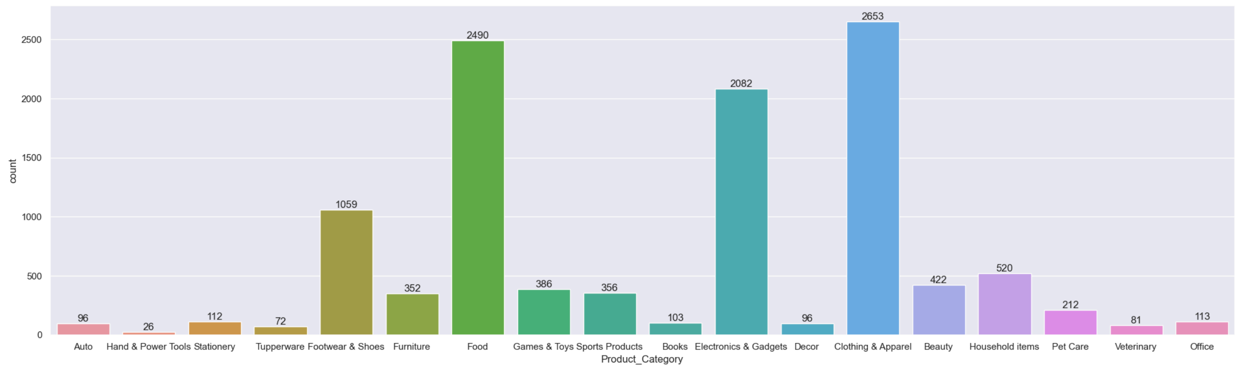
```
Out[55]: <Axes: xlabel='Occupation', ylabel='Amount'>
```



From above graphs we can see that most of the buyers are working in IT, Healthcare and Aviation sector

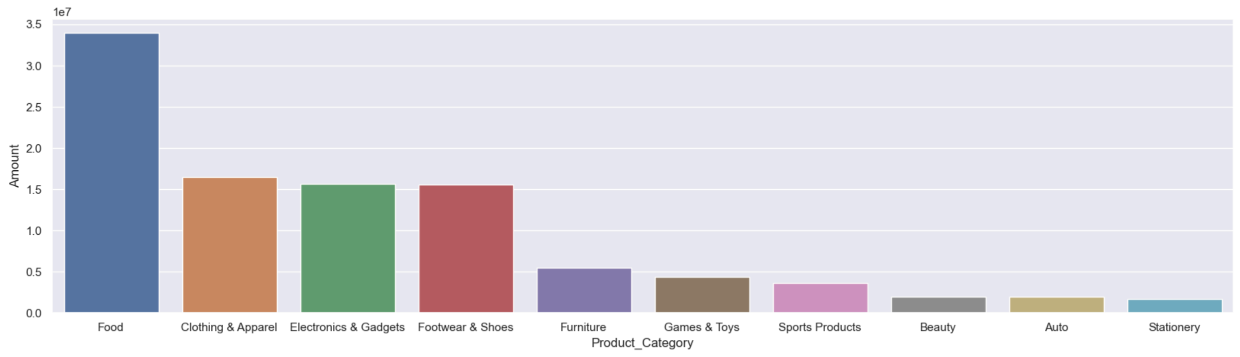
Product Category

```
In [60]: ssb.set(rc={'figure.figsize':(25,7)})
         ax = ssb.countplot(data = df, x = 'Product_Category')

         for bars in ax.containers:
             ax.bar_label(bars)
```



```
In [62]: sales_state = df.groupby(['Product_Category'], as_index=False)['Amount'].sum().sort_va

         ssb.set(rc={'figure.figsize':(20,5)})
         ssb.barplot(data = sales_state, x = 'Product_Category',y= 'Amount')
```

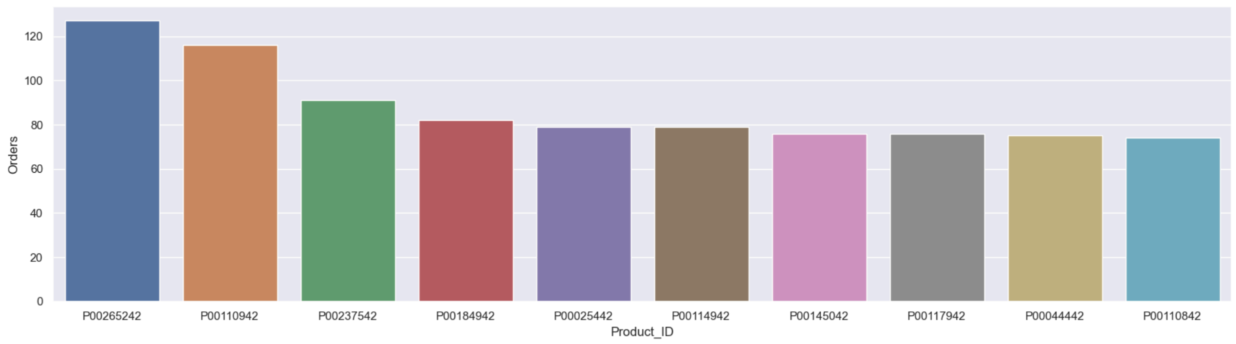
```
Out[62]: <Axes: xlabel='Product_Category', ylabel='Amount'>
```



From above graphs we can see that most of the sold products are from Food, Clothing and Electronics category

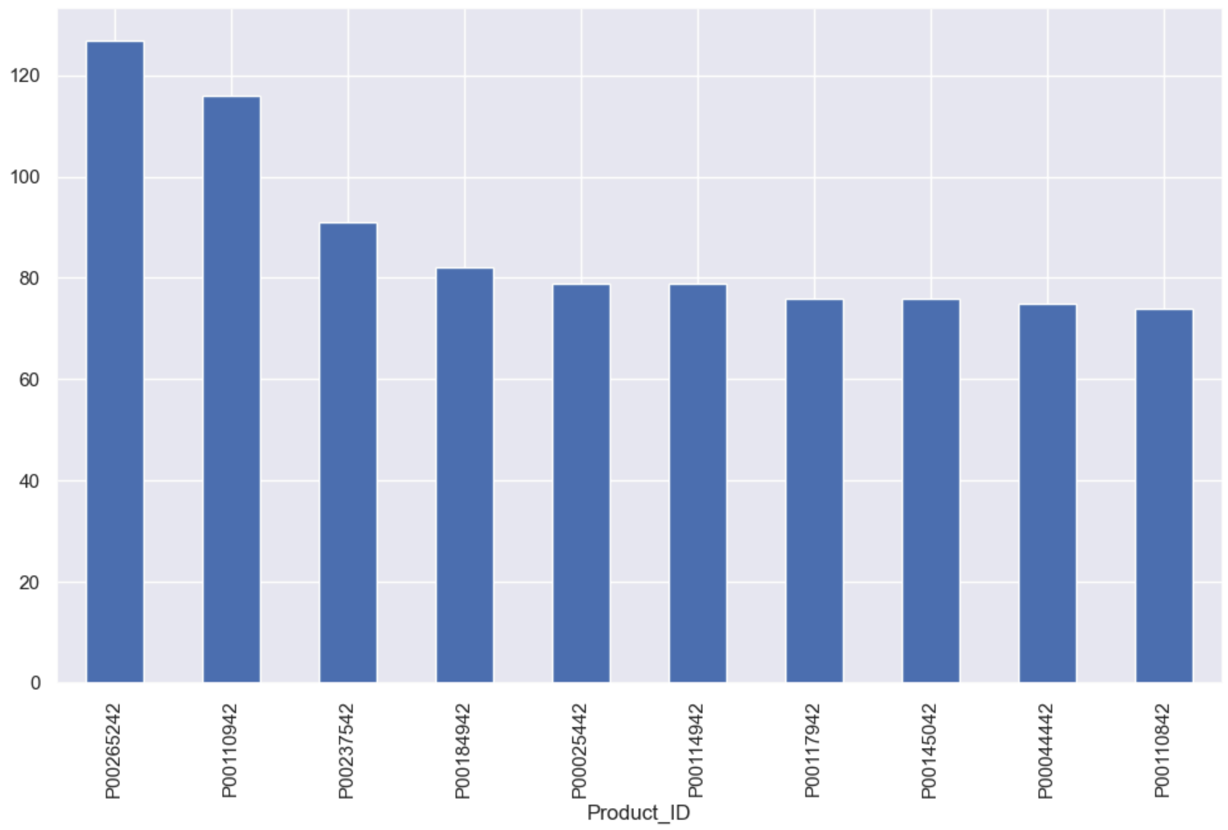
```
In [64]: sales_state = df.groupby(['Product_ID'], as_index=False)['Orders'].sum().sort_values(b

         ssb.set(rc={'figure.figsize':(20,5)})
         ssb.barplot(data = sales_state, x = 'Product_ID',y= 'Orders')
```

```
Out[64]: <Axes: xlabel='Product_ID', ylabel='Orders'>
```



```
In [65]: # top 10 most sold products (same thing as above)

         fig1, ax1 = plt.subplots(figsize=(12,7))
         df.groupby('Product_ID')['Orders'].sum().nlargest(10).sort_values(ascending=False).plo
```

```
Out[65]: <Axes: xlabel='Product_ID'>
```



Conclusion :

1. Most revenue generated by married women of age group 26-35 yrs .

2. Those womens are belong to UP, Maharastra and Karnataka .

3. Those customers are working in IT, Healthcare and Aviation and they are more likely to buy products from Food, Claothing and Electronics category .

```
In [ ]:
```