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

In [3]:
```
data = pd.read_csv('Cleaned_Customer.csv')
```

In [7]:
```
data
```

Out[7]:

	Unnamed: 0	CustomerID	Age	Gender	ContractType	MonthlyCharges	TotalCharges	TechSupport	In
0	0	1083	79.0	Male	One year	90.038513	3511.502019	No	
1	1	1117	60.0	Female	One year	80.590894	2901.272196	No	
2	2	437	53.0	Female	Two year	98.695968	6513.933908	Yes	
3	3	3833	84.0	Female	One year	43.042067	1549.514395	No	
4	4	1976	69.0	Male	One year	51.930032	2232.991377	No	
...	...	...	...	...	...	...	...	...	...
4646	5015	1514	54.0	Male	One year	57.803077	462.424613	No	
4647	5016	2716	45.0	Male	Two year	103.314530	826.516243	No	
4648	5017	756	21.0	Female	Two year	103.105344	103.105344	Yes	
4649	5018	3284	85.0	Male	Two year	36.907180	1660.823112	Yes	
4650	5019	96	65.0	Female	One year	98.243941	6582.344044	No	

4651 rows × 13 columns

In [9]:
```
data.drop(columns=['Unnamed: 0'],inplace=True)
```

In [11]:
```
data.sample(5)
```

Out[11]:

	CustomerID	Age	Gender	ContractType	MonthlyCharges	TotalCharges	TechSupport	InternetServic
3823	769	43.0	Male	Two year	71.425428	3285.569684	Yes	Fiber opti
1698	236	85.0	Male	Two year	85.809256	1630.375866	No	No
1116	2159	44.0	Male	Month-to-month	106.302596	4252.103844	Yes	DSI
250	997	51.0	Female	Two year	108.922689	2940.912607	Yes	No
2864	1666	58.0	Male	One year	100.211645	400.846579	Yes	Fiber opti

In [13]:
```
df = data.copy()
```

In [18]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4651 entries, 0 to 4650
Data columns (total 12 columns):
 #   Column            Non-Null Count  Dtype  
---  ------            --------------  -----  
 0   CustomerID        4651 non-null   int64  
 1   Age               4651 non-null   float64
 2   Gender            4651 non-null   object 
 3   ContractType      4651 non-null   object 
 4   MonthlyCharges    4651 non-null   float64
 5   TotalCharges      4651 non-null   float64
 6   TechSupport       4651 non-null   object 
 7   InternetService   4651 non-null   object 
 8   Tenure            4651 non-null   int64  
 9   PaperlessBilling  4651 non-null   object 
 10  PaymentMethod     4651 non-null   object 
 11  Churn             4651 non-null   object 
dtypes: float64(3), int64(2), object(7)
memory usage: 436.2+ KB
```

Column Types

- **Numerical** - CustomerID,Age,Monthlychargers,Totalcharges,Tenure
- **Categorical** - Gender, ContractType, TechSupport, InternetService, PaperlessBilling,PaymentMethod,Churn

Univariate Analysis

Univariate analysis focuses on analyzing each feature in the dataset independently.

- **Distribution analysis**: The distribution of each feature is examined to identify its shape, central tendency, and dispersion.
- **Identifying potential issues**: Univariate analysis helps in identifying potential problems with the data such as outliers, skewness, and missing values

Univariate Analysis on Categorical Columns

In [14]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4651 entries, 0 to 4650
Data columns (total 12 columns):
 #   Column            Non-Null Count  Dtype  
---  ------            --------------  -----  
 0   CustomerID        4651 non-null   int64  
 1   Age               4651 non-null   float64
 2   Gender            4651 non-null   object 
 3   ContractType      4651 non-null   object 
 4   MonthlyCharges    4651 non-null   float64
 5   TotalCharges      4651 non-null   float64
 6   TechSupport       4651 non-null   object 
 7   InternetService   4651 non-null   object 
 8   Tenure            4651 non-null   int64  
 9   PaperlessBilling  4651 non-null   object 
 10  PaymentMethod     4651 non-null   object 
 11  Churn             4651 non-null   object 
dtypes: float64(3), int64(2), object(7)
memory usage: 436.2+ KB
```

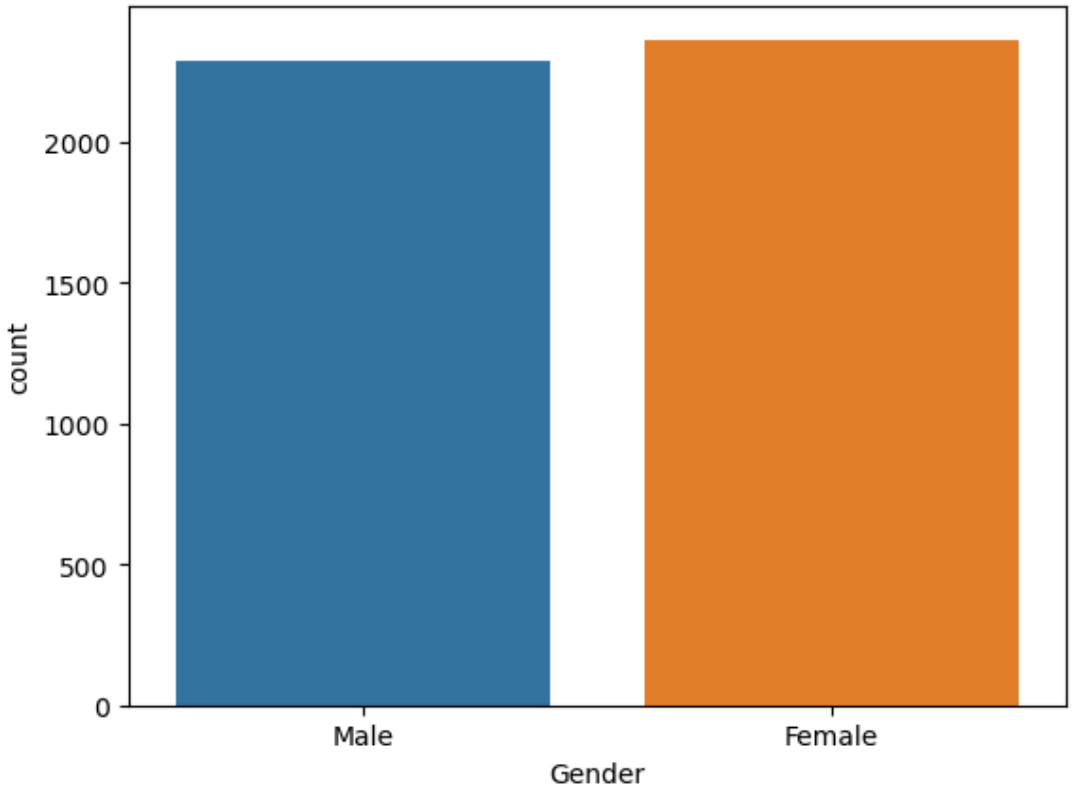
Gender

Conclusion :-

- No Missing Values
- Female Customer are More in number

In [19]:
```
sns.countplot(data=df,x='Gender')
```

Out[19]:
```
<Axes: xlabel='Gender', ylabel='count'>
```



In [20]:
```
df.Gender.isna().sum()
```

Out[20]:
```
0
```

ContractType:

Conclusion :-

- No Missing Values
- Converted to new Column ContractType_in_Days which contains the number of days as a contract

In [21]:
```
df.ContractType.value_counts()
```

Out[21]:
```
ContractType
One year          1595
Two year          1556
Month-to-month    1500
Name: count, dtype: int64
```

In [26]:
```
def conversion_days(data):
    if 'One year' == data:
        return 365
    elif 'Two year' == data:
        return 365*2
    else:
        return 30
days = df.ContractType.apply(conversion_days)
```

In [28]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4651 entries, 0 to 4650
Data columns (total 12 columns):
 #   Column            Non-Null Count  Dtype  
---  ------            --------------  -----  
 0   CustomerID        4651 non-null   int64  
 1   Age               4651 non-null   float64
 2   Gender            4651 non-null   object 
 3   ContractType      4651 non-null   object 
 4   MonthlyCharges    4651 non-null   float64
 5   TotalCharges      4651 non-null   float64
 6   TechSupport       4651 non-null   object 
 7   InternetService   4651 non-null   object 
 8   Tenure            4651 non-null   int64  
 9   PaperlessBilling  4651 non-null   object 
 10  PaymentMethod     4651 non-null   object 
 11  Churn             4651 non-null   object 
dtypes: float64(3), int64(2), object(7)
memory usage: 436.2+ KB
```

In [29]:
```
df.insert(3,'ContractType_In_days',days)
```

In [31]:
```
df.drop(columns=['ContractType'],inplace=True)
```

In [32]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4651 entries, 0 to 4650
Data columns (total 12 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   CustomerID            4651 non-null   int64  
 1   Age                   4651 non-null   float64
 2   Gender                4651 non-null   object 
 3   ContractType_In_days  4651 non-null   int64  
 4   MonthlyCharges        4651 non-null   float64
 5   TotalCharges          4651 non-null   float64
 6   TechSupport           4651 non-null   object 
 7   InternetService       4651 non-null   object 
 8   Tenure                4651 non-null   int64  
 9   PaperlessBilling      4651 non-null   object 
 10  PaymentMethod         4651 non-null   object 
 11  Churn                 4651 non-null   object 
dtypes: float64(3), int64(3), object(6)
memory usage: 436.2+ KB
```

TechSupport:

Conclusion :-

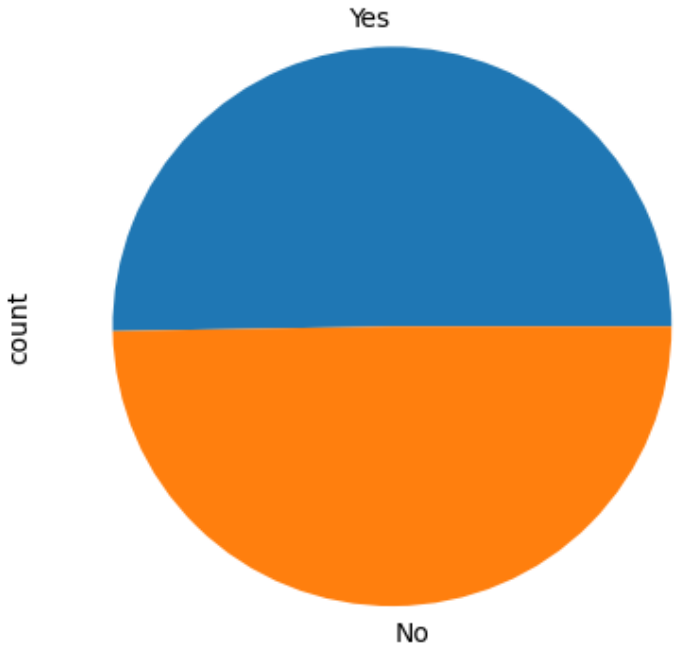
- No Missing Values
- Value are almost divided equally

In [34]:
```
df.TechSupport.value_counts()
```

Out[34]:
```
TechSupport
Yes    2338
No     2313
Name: count, dtype: int64
```

In [36]:
```
df.TechSupport.value_counts().plot(kind='pie')
```

Out[36]:
```
<Axes: ylabel='count'>
```



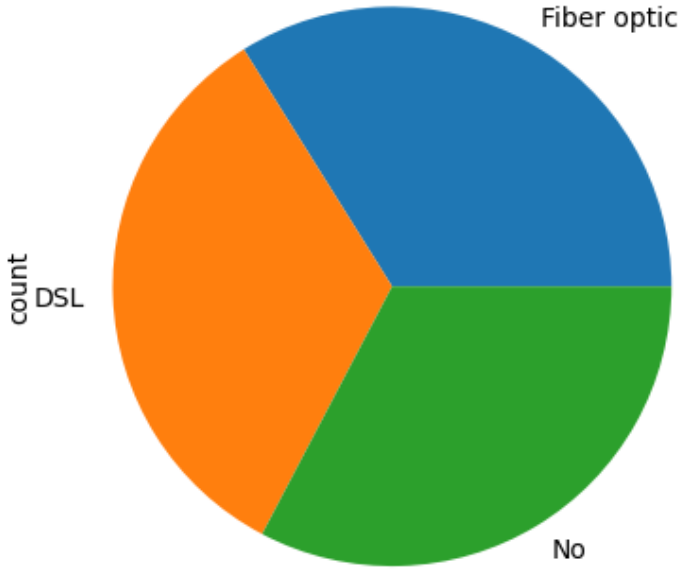
InternetService:

Conclusion :-

- No Missing Values
- Value are almost divided equally

In [38]:
```
df.InternetService.value_counts().plot(kind = 'pie')
```

Out[38]:
```
<Axes: ylabel='count'>
```



In [39]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4651 entries, 0 to 4650
Data columns (total 12 columns):
 #   Column                Non-Null Count  Dtype
---  ------                --------------  -----
 0   CustomerID            4651 non-null   int64
 1   Age                   4651 non-null   float64
 2   Gender                4651 non-null   object
 3   ContractType_In_days  4651 non-null   int64
 4   MonthlyCharges        4651 non-null   float64
 5   TotalCharges          4651 non-null   float64
 6   TechSupport           4651 non-null   object
 7   InternetService       4651 non-null   object
 8   Tenure                4651 non-null   int64
 9   PaperlessBilling      4651 non-null   object
 10  PaymentMethod         4651 non-null   object
 11  Churn                 4651 non-null   object
dtypes: float64(3), int64(3), object(6)
memory usage: 436.2+ KB
```

PaperlessBilling:

`Conclusion`:-

- No Missing Values
- Value are almost divided equally

In [40]:
```
df.PaperlessBilling.value_counts()
```

Out[40]:
```
PaperlessBilling
No     2366
Yes    2285
Name: count, dtype: int64
```

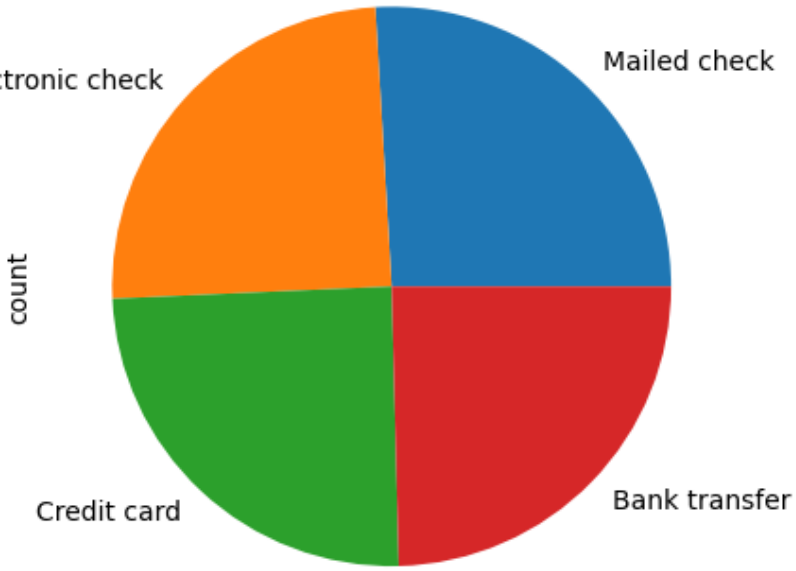
PaymentMethod:

Conclusion :-

- No Missing Values
- Value are almost divided equally

In [42]:
```
df.PaymentMethod.value_counts().plot(kind='pie')
```

Out[42]:
```
<Axes: ylabel='count'>
```



Churn:

Conclusion :-

- No Missing Values
- Value are almost divided equally

In [43]:
```
df.Churn.value_counts()
```

Out[43]:
```
Churn
Yes    2374
No     2277
Name: count, dtype: int64
```

Univariate Analysis on Numerical columns

In [44]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4651 entries, 0 to 4650
Data columns (total 12 columns):
 #   Column                Non-Null Count  Dtype
---  ------                --------------  -----
 0   CustomerID            4651 non-null   int64
 1   Age                   4651 non-null   float64
 2   Gender                4651 non-null   object
 3   ContractType_In_days  4651 non-null   int64
 4   MonthlyCharges        4651 non-null   float64
 5   TotalCharges          4651 non-null   float64
 6   TechSupport           4651 non-null   object
 7   InternetService       4651 non-null   object
 8   Tenure                4651 non-null   int64
 9   PaperlessBilling      4651 non-null   object
 10  PaymentMethod         4651 non-null   object
 11  Churn                 4651 non-null   object
dtypes: float64(3), int64(3), object(6)
memory usage: 436.2+ KB
```

Age:

Conclusion :-

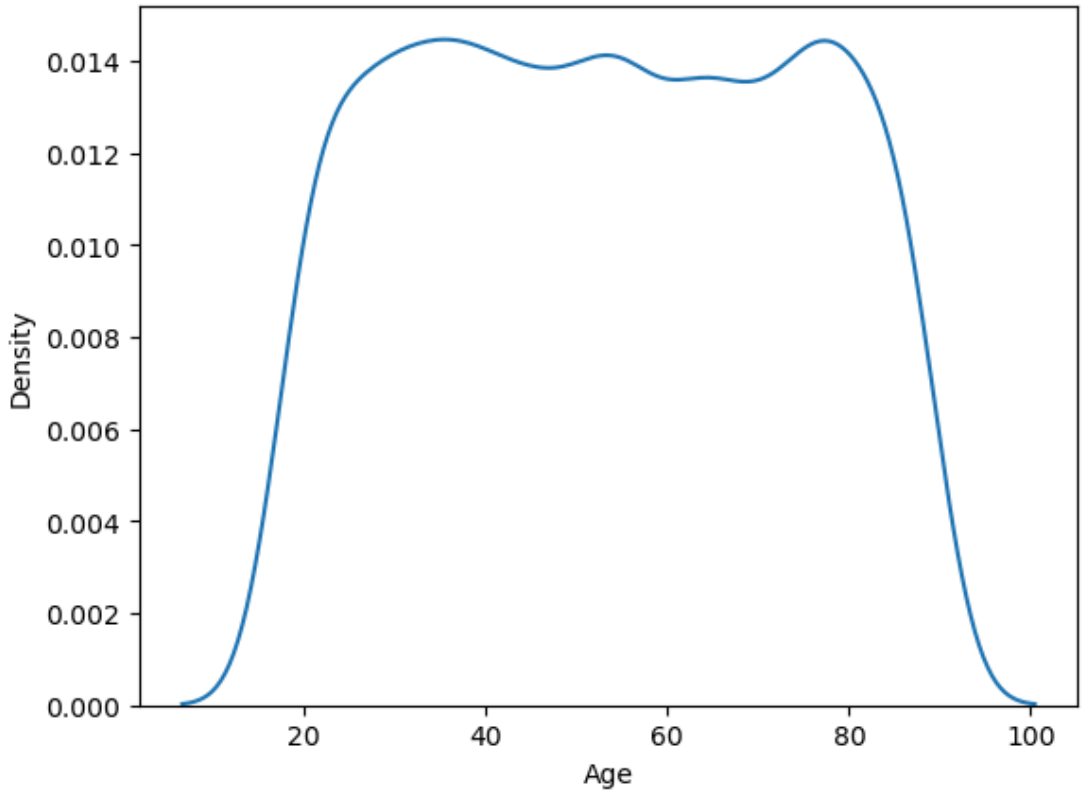
- No Missing Values
- No Outlier Found

In [45]:
```
df.Age.describe()
```

Out[45]:
```
count    4651.000000
mean       53.321221
std        20.679189
min        18.000000
25%        35.000000
50%        53.000000
75%        71.000000
max        89.000000
Name: Age, dtype: float64
```

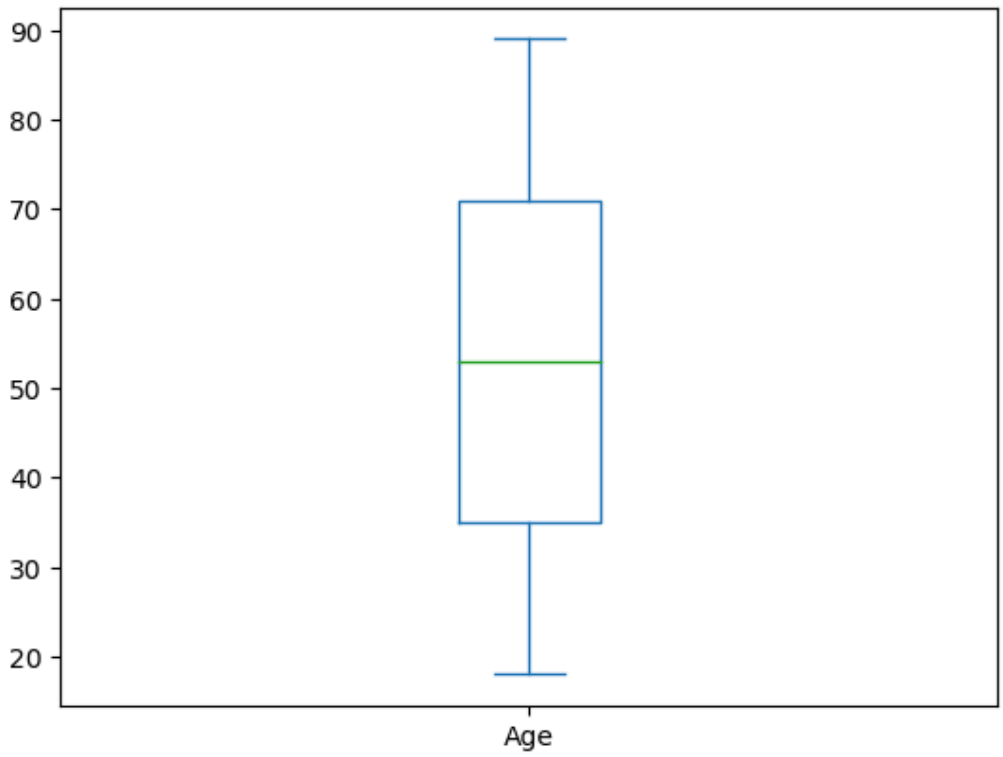
In [47]:
```
sns.kdeplot(data=df,x='Age')
```

Out[47]: <Axes: xlabel='Age', ylabel='Density'>



In [48]:
```
df.Age.plot(kind='box')
```

Out[48]: <Axes: >



In [49]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4651 entries, 0 to 4650
Data columns (total 12 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   CustomerID            4651 non-null   int64  
 1   Age                   4651 non-null   float64
 2   Gender                4651 non-null   object 
 3   ContractType_In_days  4651 non-null   int64  
 4   MonthlyCharges        4651 non-null   float64
 5   TotalCharges          4651 non-null   float64
 6   TechSupport           4651 non-null   object 
 7   InternetService       4651 non-null   object 
 8   Tenure                4651 non-null   int64  
 9   PaperlessBilling      4651 non-null   object 
 10  PaymentMethod         4651 non-null   object 
 11  Churn                 4651 non-null   object 
dtypes: float64(3), int64(3), object(6)
memory usage: 436.2+ KB
```

MonthlyCharges:

Conclusion :-

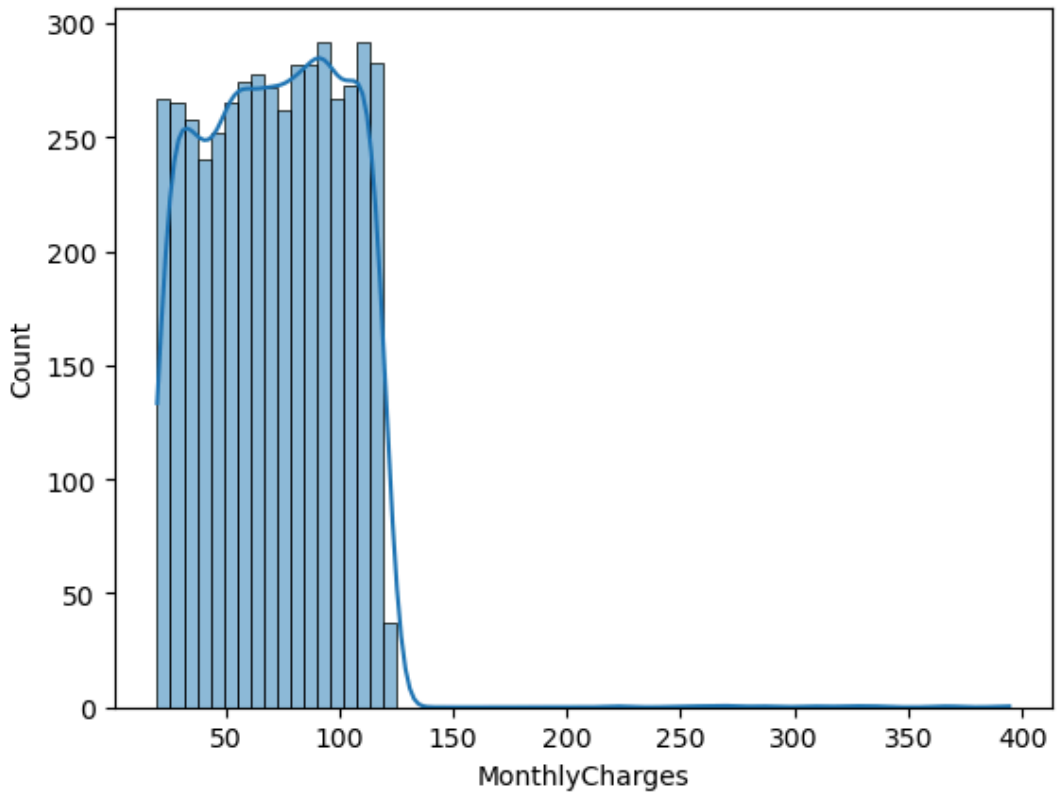
- No Missing Values
- Outliers have been handled

In [50]:
```
df.MonthlyCharges.describe()
```

Out[50]:
```
count    4651.000000
mean       71.586361
std        30.894229
min        20.030708
25%        46.904230
50%        71.630182
75%        96.053310
max       394.364052
Name: MonthlyCharges, dtype: float64
```

In [52]:
```
sns.histplot(data=df,x='MonthlyCharges',kde=True)
```

Out[52]:
```
<Axes: xlabel='MonthlyCharges', ylabel='Count'>
```



In [53]:
```
df.MonthlyCharges.skew()
```

Out[53]:
```
0.944190282237162
```

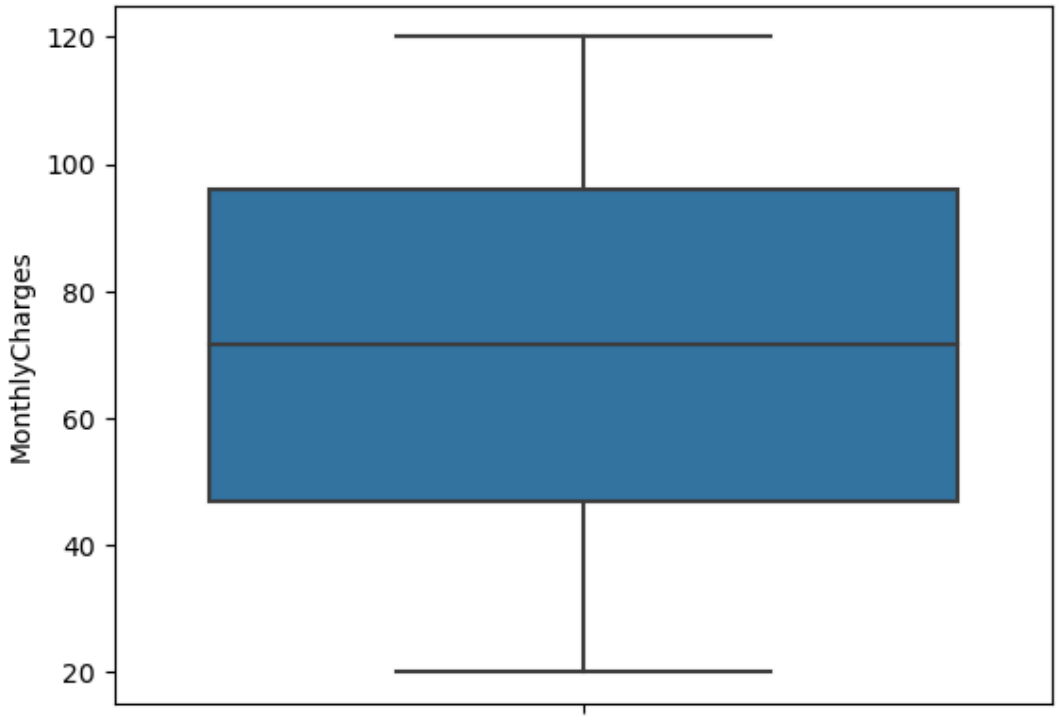
In [61]:
```
df = df[~(df.MonthlyCharges>200)]
```

In [62]:
```
df.MonthlyCharges.skew()
```

Out[62]:
```
-0.05023282989140127
```

In [65]:
```
sns.boxplot(data=df,y='MonthlyCharges')
```

Out[65]: <Axes: ylabel='MonthlyCharges'>



In [66]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 4641 entries, 0 to 4650
Data columns (total 12 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   CustomerID            4641 non-null   int64  
 1   Age                   4641 non-null   float64
 2   Gender                4641 non-null   object 
 3   ContractType_In_days  4641 non-null   int64  
 4   MonthlyCharges        4641 non-null   float64
 5   TotalCharges          4641 non-null   float64
 6   TechSupport           4641 non-null   object 
 7   InternetService       4641 non-null   object 
 8   Tenure                4641 non-null   int64  
 9   PaperlessBilling      4641 non-null   object 
 10  PaymentMethod         4641 non-null   object 
 11  Churn                 4641 non-null   object 
dtypes: float64(3), int64(3), object(6)
memory usage: 471.4+ KB
```

TotalCharges:

Conclusion :-

- No Missing Values
- Around 250 rows have droped as it contains the outlier values

In [67]:
```
df.TotalCharges.describe()
```

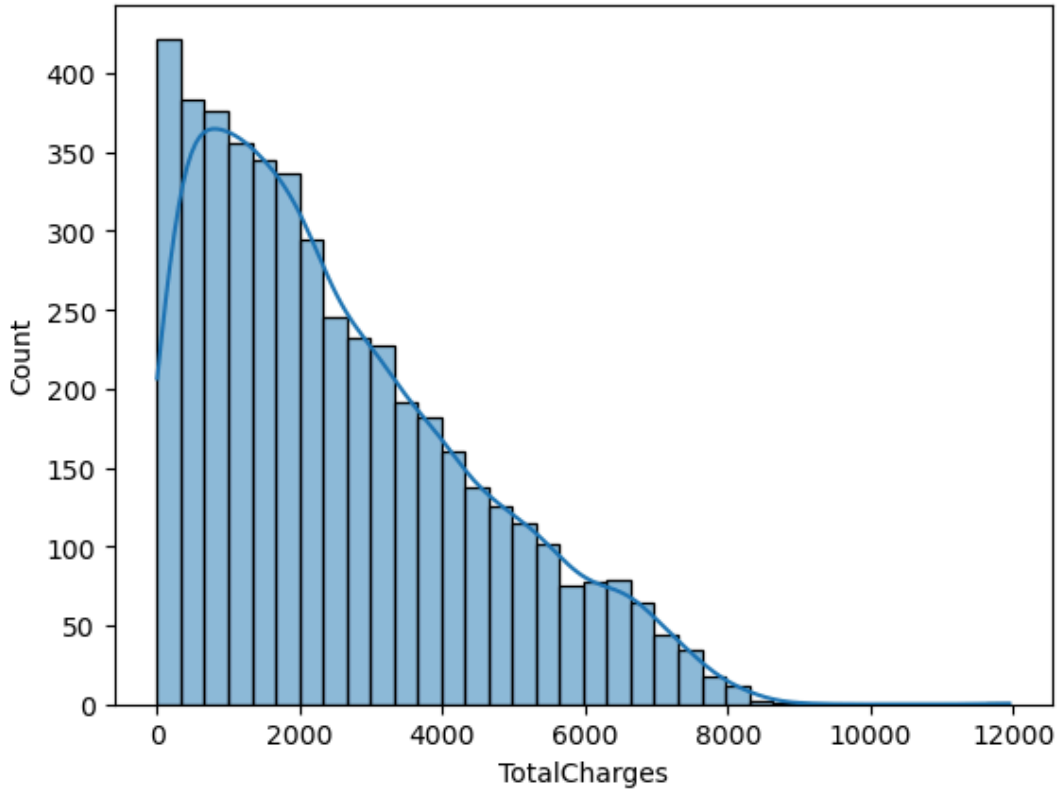
Out[67]:
```
count     4641.000000
mean      2547.948386
std       1926.446844
min          0.000000
25%        981.664836
50%       2106.499950
75%       3788.770844
max      11943.264877
Name: TotalCharges, dtype: float64
```

In [68]:
```
df.TotalCharges.skew()
```

Out[68]:
```
0.7841534300429074
```

In [70]:
```
sns.histplot(data=df,x='TotalCharges',kde=True)
```

Out[70]:
```
<Axes: xlabel='TotalCharges', ylabel='Count'>
```



In [78]:
```
df = df[~(df.TotalCharges>6500)]
```

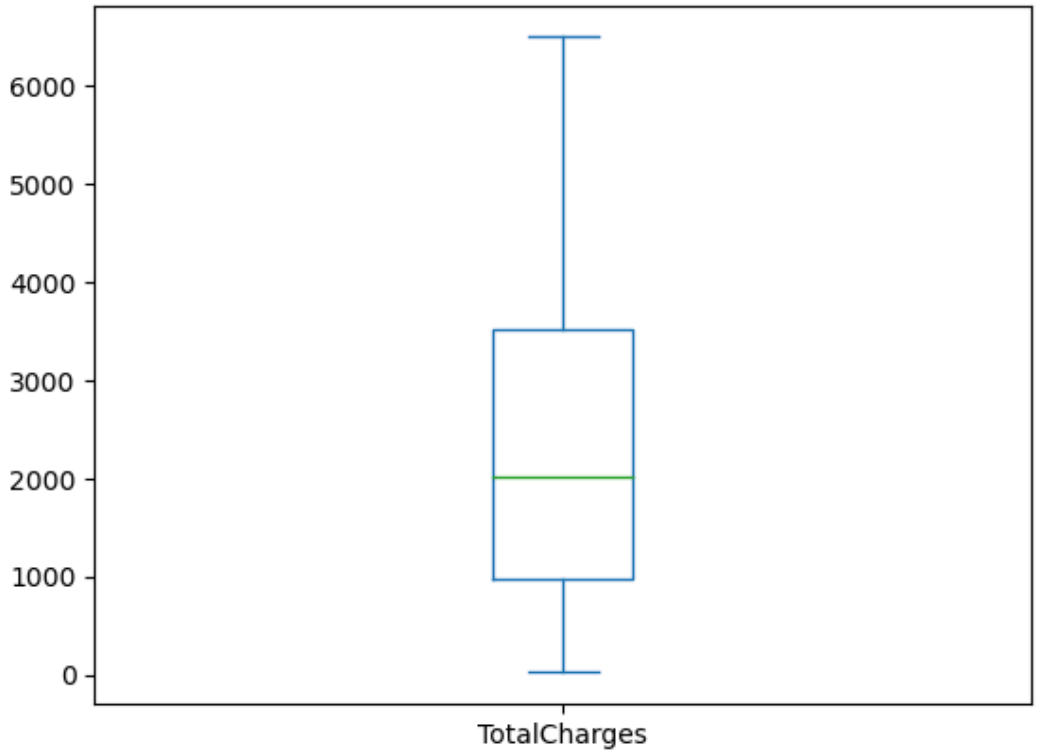
In [85]:
```
df = df[~(df.TotalCharges==0)]
```

In [86]:
```
df.TotalCharges.skew()
```

Out[86]:
```
0.6042191935647911
```

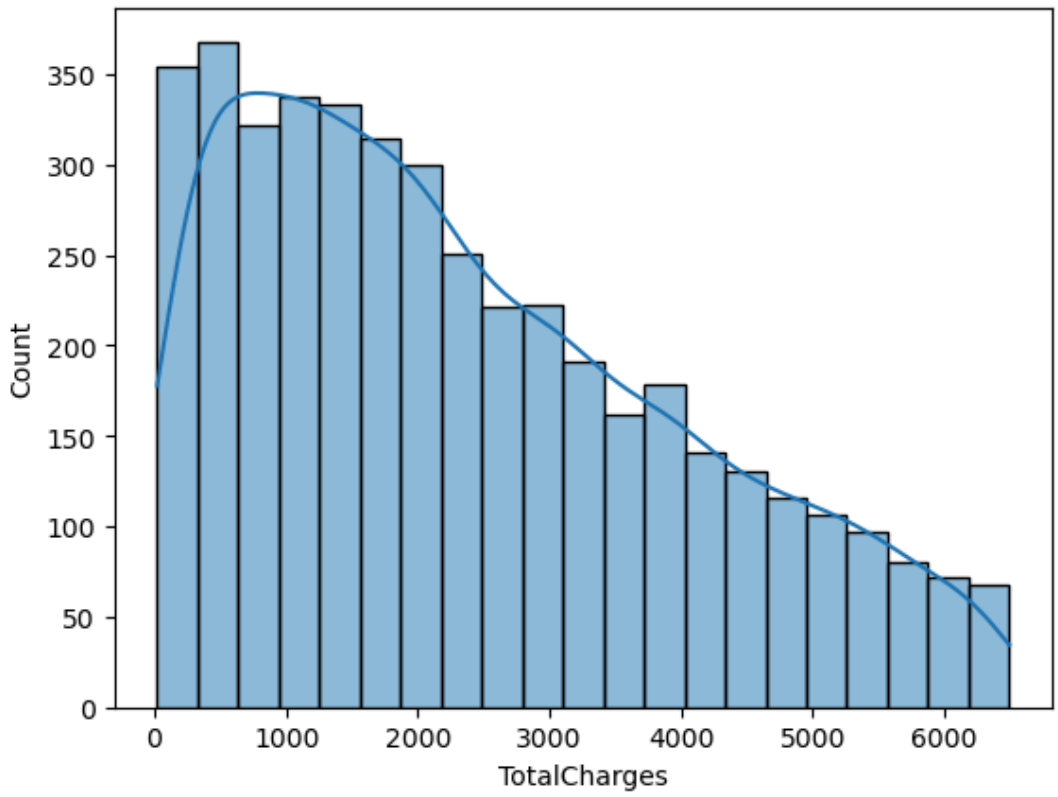
In [87]:
```
df.TotalCharges.plot(kind='box')
```

Out[87]: <Axes: >



In [88]:
```
sns.histplot(data=df,x='TotalCharges',kde=True)
```

Out[88]: <Axes: xlabel='TotalCharges', ylabel='Count'>



In [89]:
```
df.TotalCharges.describe()
```

Out[89]:
```
count    4364.000000
mean     2362.864874
std      1665.823190
min        20.099899
25%       980.043353
50%      2020.433565
75%      3514.907060
max      6494.540110
Name: TotalCharges, dtype: float64
```

In [90]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 4364 entries, 0 to 4649
Data columns (total 12 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   CustomerID            4364 non-null   int64  
 1   Age                   4364 non-null   float64
 2   Gender                4364 non-null   object 
 3   ContractType_In_days  4364 non-null   int64  
 4   MonthlyCharges        4364 non-null   float64
 5   TotalCharges          4364 non-null   float64
 6   TechSupport           4364 non-null   object 
 7   InternetService       4364 non-null   object 
 8   Tenure                4364 non-null   int64  
 9   PaperlessBilling      4364 non-null   object 
 10  PaymentMethod         4364 non-null   object 
 11  Churn                 4364 non-null   object 
dtypes: float64(3), int64(3), object(6)
memory usage: 443.2+ KB
```

Tenure:

Conclusion :-

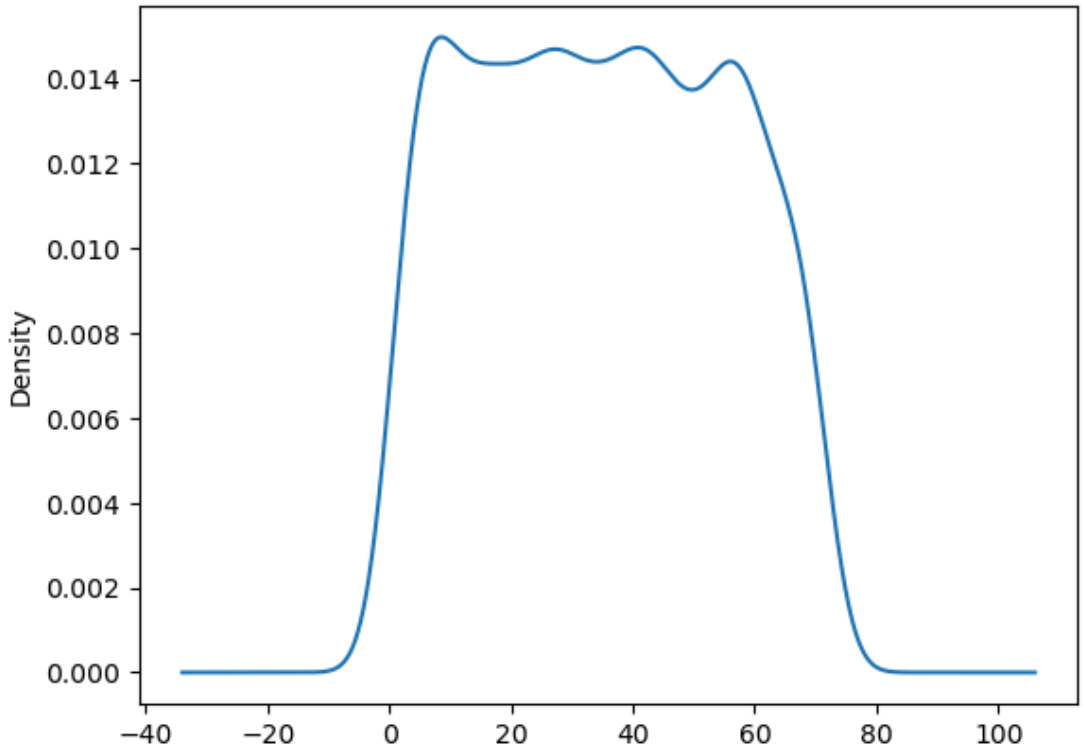
- No Missing Values
- Value are almost divided equally

In [105]:
```
df.Tenure.describe()
```

Out[105]:
```
count    4364.000000
mean       34.683547
std        20.125995
min         1.000000
25%        17.000000
50%        34.000000
75%        52.000000
max        71.000000
Name: Tenure, dtype: float64
```

In [107]:
```
df.Tenure.plot(kind='kde')
```

Out[107]: <Axes: ylabel='Density'>



In [108]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 4364 entries, 0 to 4649
Data columns (total 12 columns):
 #   Column                Non-Null Count  Dtype
---  ------                --------------  -----
 0   CustomerID            4364 non-null   int64
 1   Age                   4364 non-null   float64
 2   Gender                4364 non-null   object
 3   ContractType_In_days  4364 non-null   int64
 4   MonthlyCharges        4364 non-null   float64
 5   TotalCharges          4364 non-null   float64
 6   TechSupport           4364 non-null   object
 7   InternetService       4364 non-null   object
 8   Tenure                4364 non-null   int64
 9   PaperlessBilling      4364 non-null   object
 10  PaymentMethod         4364 non-null   object
 11  Churn                 4364 non-null   object
dtypes: float64(3), int64(3), object(6)
memory usage: 443.2+ KB
```

In [109]:
```
df
```

Out[109]:

	CustomerID	Age	Gender	ContractType_In_days	MonthlyCharges	TotalCharges	TechSupport	Interr
0	1083	79.0	Male	365	90.038513	3511.502019	No	
1	1117	60.0	Female	365	80.590894	2901.272196	No	
3	3833	84.0	Female	365	43.042067	1549.514395	No	
4	1976	69.0	Male	365	51.930032	2232.991377	No	
6	3132	49.0	Male	365	101.524194	913.717747	Yes	
...	...	...	...	...	...	...	...	
4645	2133	39.0	Male	365	30.017101	210.119705	No	
4646	1514	54.0	Male	365	57.803077	462.424613	No	
4647	2716	45.0	Male	730	103.314530	826.516243	No	
4648	756	21.0	Female	730	103.105344	103.105344	Yes	
4649	3284	85.0	Male	730	36.907180	1660.823112	Yes	

4364 rows × 12 columns

Bivariate Analysis

Categorical - Categorical

In [110]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 4364 entries, 0 to 4649
Data columns (total 12 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   CustomerID            4364 non-null   int64  
 1   Age                   4364 non-null   float64
 2   Gender                4364 non-null   object 
 3   ContractType_In_days  4364 non-null   int64  
 4   MonthlyCharges        4364 non-null   float64
 5   TotalCharges          4364 non-null   float64
 6   TechSupport           4364 non-null   object 
 7   InternetService       4364 non-null   object 
 8   Tenure                4364 non-null   int64  
 9   PaperlessBilling      4364 non-null   object 
 10  PaymentMethod         4364 non-null   object 
 11  Churn                 4364 non-null   object 
dtypes: float64(3), int64(3), object(6)
memory usage: 443.2+ KB
```

Gender and TechSupport

--> Females Likes to support the tech

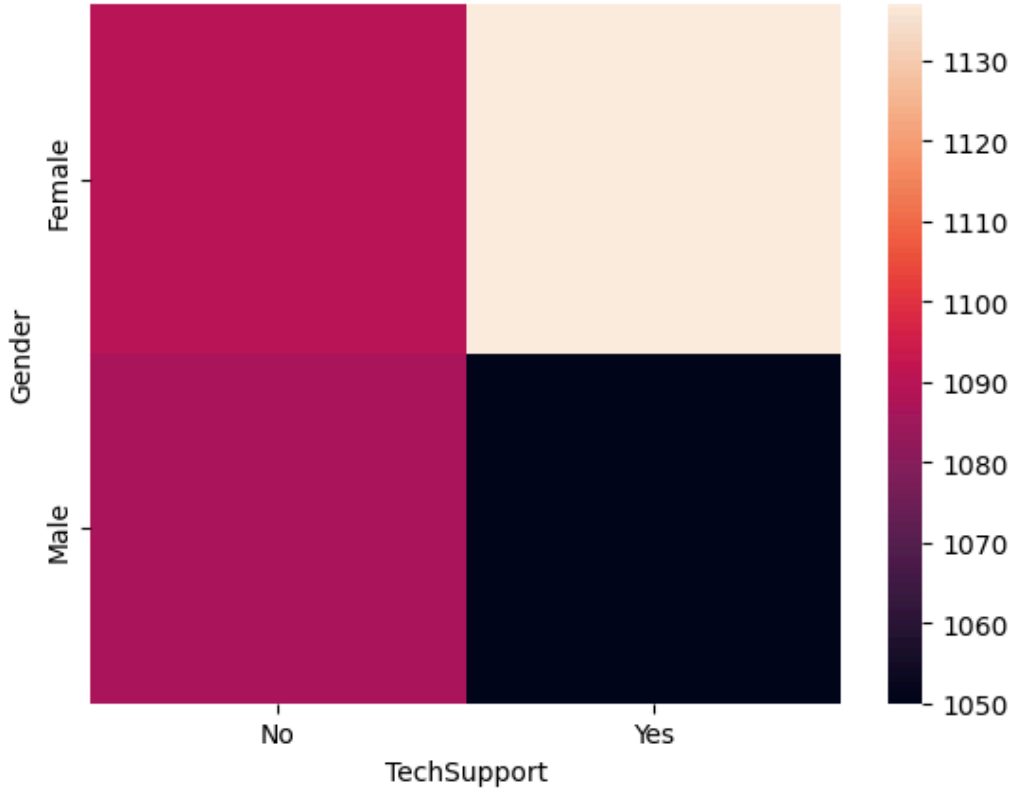
In [115]:
```
pd.crosstab(df.Gender,df.TechSupport)
```

Out[115]:

TechSupport	No	Yes
Gender		
Female	1090	1137
Male	1087	1050

In [114]:
```
sns.heatmap(pd.crosstab(df.Gender,df.TechSupport))
```

Out[114]: <Axes: xlabel='TechSupport', ylabel='Gender'>



Gender and InternetService

In [124]:
```
pd.crosstab(df.Gender,df.InternetService)
```

Out[124]:

InternetService	DSL	Fiber optic	No
Gender			
Female	730	773	724
Male	745	694	698

In [125]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 4364 entries, 0 to 4649
Data columns (total 12 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   CustomerID            4364 non-null   int64  
 1   Age                   4364 non-null   float64
 2   Gender                4364 non-null   object 
 3   ContractType_In_days  4364 non-null   int64  
 4   MonthlyCharges        4364 non-null   float64
 5   TotalCharges          4364 non-null   float64
 6   TechSupport           4364 non-null   object 
 7   InternetService       4364 non-null   object 
 8   Tenure                4364 non-null   int64  
 9   PaperlessBilling      4364 non-null   object 
 10  PaymentMethod         4364 non-null   object 
 11  Churn                 4364 non-null   object 
dtypes: float64(3), int64(3), object(6)
memory usage: 443.2+ KB
```

Gender and PaymentMethod,PaperlessBilling

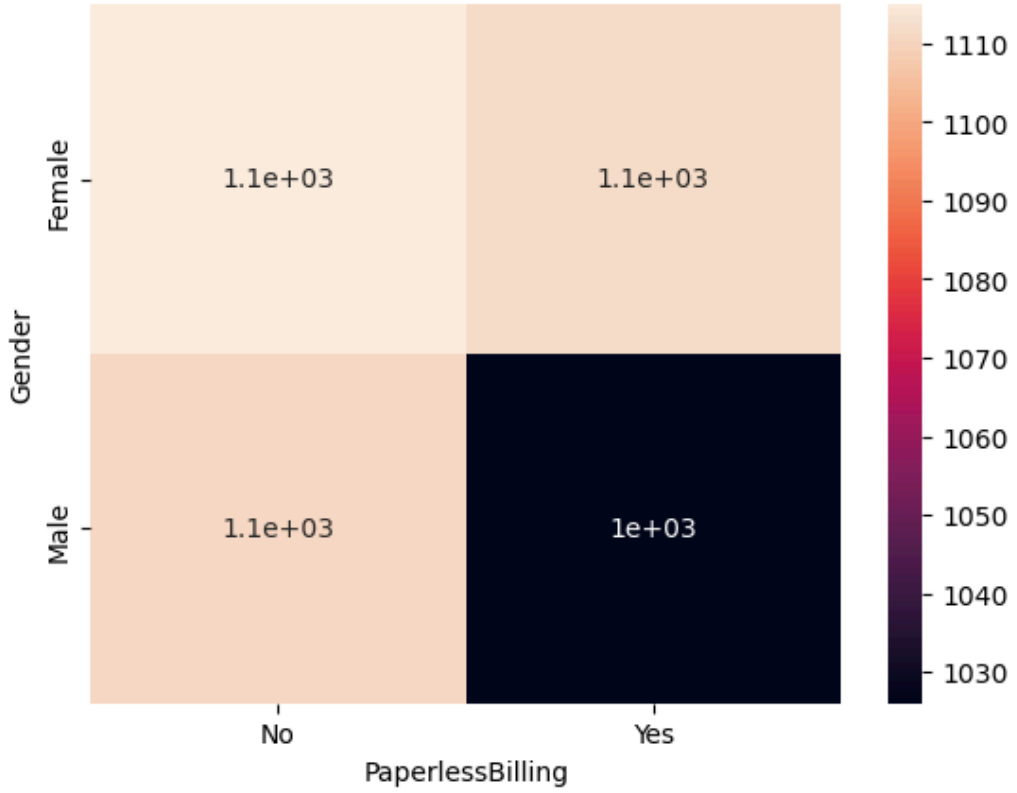
In [126]:
```
pd.crosstab(df.Gender,df.PaymentMethod)
```

Out[126]:

PaymentMethod	Bank transfer	Credit card	Electronic check	Mailed check
Gender				
Female	537	557	556	577
Male	541	531	523	542

In [128]:
```
sns.heatmap(pd.crosstab(df.Gender,df.PaperlessBilling),annot=True)
```

Out[128]: <Axes: xlabel='PaperlessBilling', ylabel='Gender'>



Churn and Gender

--> Generally females are not statisfied with the services provided by the company

In [155]:
```
pd.crosstab(df.Churn,df.Gender)
```

Out[155]:

Gender	Female	Male
Churn		
No	1092	1039
Yes	1135	1098

Numerical - Categorical

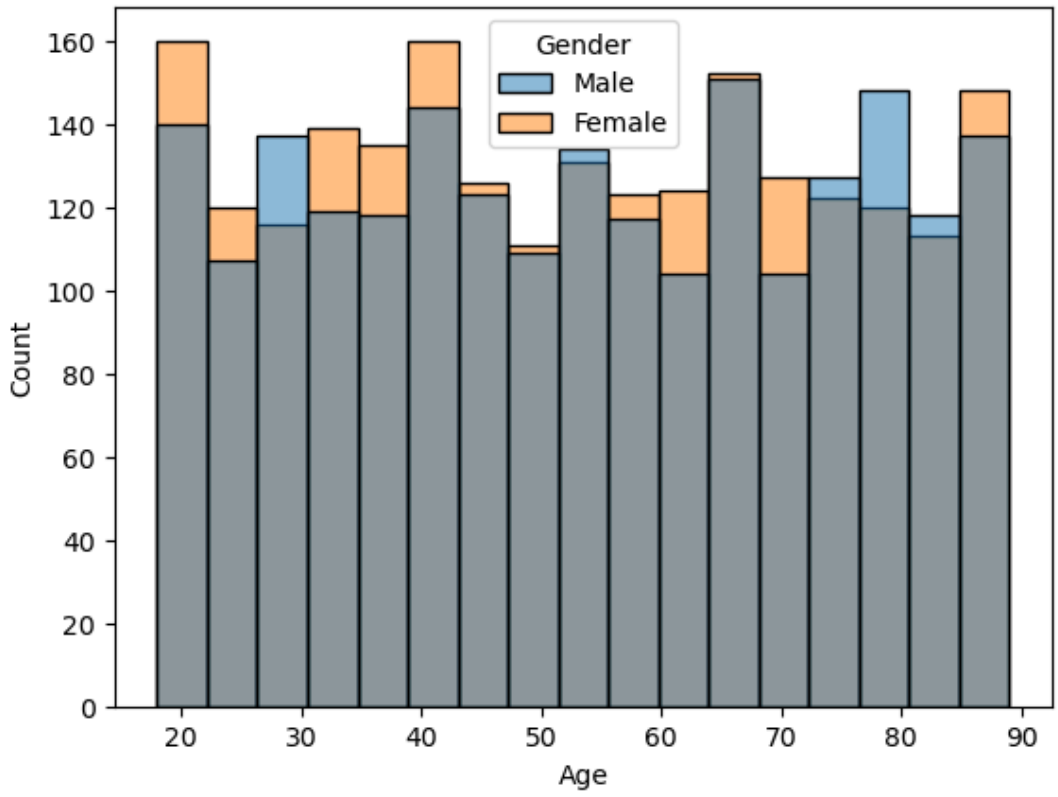
In [129]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 4364 entries, 0 to 4649
Data columns (total 12 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   CustomerID            4364 non-null   int64  
 1   Age                   4364 non-null   float64
 2   Gender                4364 non-null   object 
 3   ContractType_In_days  4364 non-null   int64  
 4   MonthlyCharges        4364 non-null   float64
 5   TotalCharges          4364 non-null   float64
 6   TechSupport           4364 non-null   object 
 7   InternetService       4364 non-null   object 
 8   Tenure                4364 non-null   int64  
 9   PaperlessBilling      4364 non-null   object 
 10  PaymentMethod         4364 non-null   object 
 11  Churn                 4364 non-null   object 
dtypes: float64(3), int64(3), object(6)
memory usage: 443.2+ KB
```

Gender and Age

In [137]:
```
sns.histplot(data=df,x='Age',hue='Gender')
```

Out[137]:
```
<Axes: xlabel='Age', ylabel='Count'>
```



In [133]:
```
df.sample(5)
```

Out[133]:

	CustomerID	Age	Gender	ContractType_In_days	MonthlyCharges	TotalCharges	TechSupport	Interr
3607	4406	21.0	Male	30	89.551048	805.959429	Yes	
4179	2011	85.0	Male	730	91.927139	5055.992618	Yes	
4560	3453	46.0	Male	365	118.828859	5347.298652	No	
3544	2667	36.0	Female	30	47.225436	377.803488	No	
4110	1430	88.0	Female	365	22.864593	297.239711	Yes	

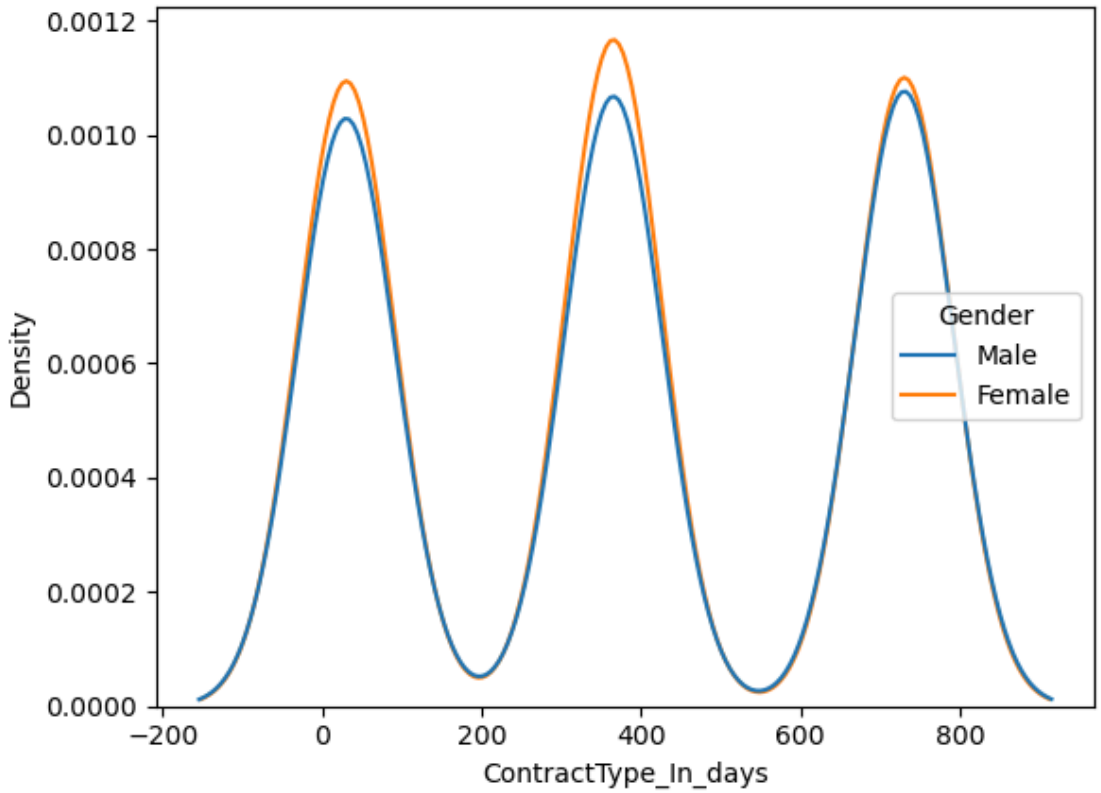
In [138]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 4364 entries, 0 to 4649
Data columns (total 12 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   CustomerID            4364 non-null   int64  
 1   Age                   4364 non-null   float64
 2   Gender                4364 non-null   object 
 3   ContractType_In_days  4364 non-null   int64  
 4   MonthlyCharges        4364 non-null   float64
 5   TotalCharges          4364 non-null   float64
 6   TechSupport           4364 non-null   object 
 7   InternetService       4364 non-null   object 
 8   Tenure                4364 non-null   int64  
 9   PaperlessBilling      4364 non-null   object 
 10  PaymentMethod         4364 non-null   object 
 11  Churn                 4364 non-null   object 
dtypes: float64(3), int64(3), object(6)
memory usage: 443.2+ KB
```

Gender and Contracttype in days

In [144]:
```
sns.kdeplot(data=df,x='ContractType_In_days',hue='Gender')
```

Out[144]:
```
<Axes: xlabel='ContractType_In_days', ylabel='Density'>
```



TotalCharges and InternetService

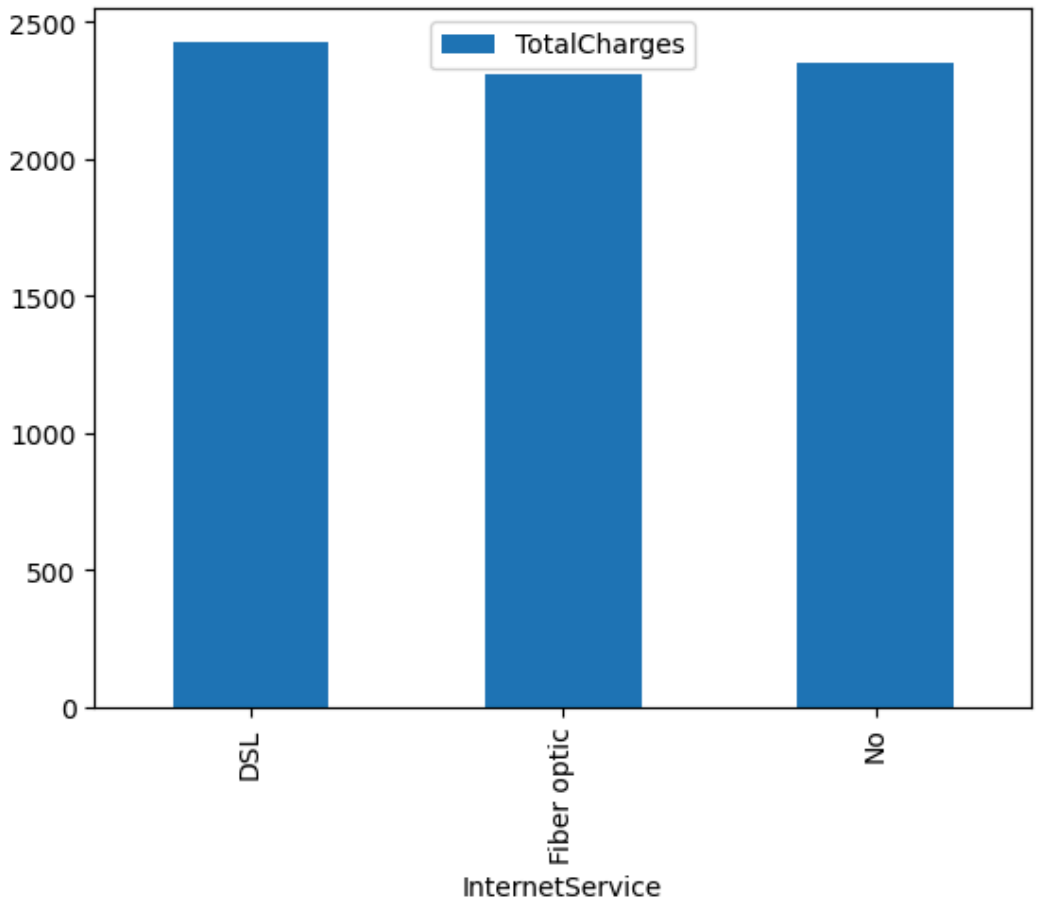
In [150]:
```
df[['InternetService','TotalCharges']].groupby('InternetService').mean()
```

Out[150]:

InternetService	TotalCharges
DSL	2427.036222
Fiber optic	2308.772171
No	2352.106266

In [152]:
```
df[['InternetService','TotalCharges']].groupby('InternetService').mean().plot(kind='ba
```

Out[152]: <Axes: xlabel='InternetService'>



In [153]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 4364 entries, 0 to 4649
Data columns (total 12 columns):
 #   Column                Non-Null Count  Dtype
---  ------                --------------  -----
 0   CustomerID            4364 non-null   int64
 1   Age                   4364 non-null   float64
 2   Gender                4364 non-null   object
 3   ContractType_In_days  4364 non-null   int64
 4   MonthlyCharges        4364 non-null   float64
 5   TotalCharges          4364 non-null   float64
 6   TechSupport           4364 non-null   object
 7   InternetService       4364 non-null   object
 8   Tenure                4364 non-null   int64
 9   PaperlessBilling      4364 non-null   object
 10  PaymentMethod         4364 non-null   object
 11  Churn                 4364 non-null   object
dtypes: float64(3), int64(3), object(6)
memory usage: 443.2+ KB
```

Churn and MonthlyCharges

In [161]:
```
df.Churn.value_counts()
```

Out[161]:
```
Churn
Yes    2233
No     2131
Name: count, dtype: int64
```

In [162]:
```
df[['Churn','MonthlyCharges']].groupby('Churn').mean()
```

Out[162]:

Churn	MonthlyCharges
No	69.526712
Yes	69.070298

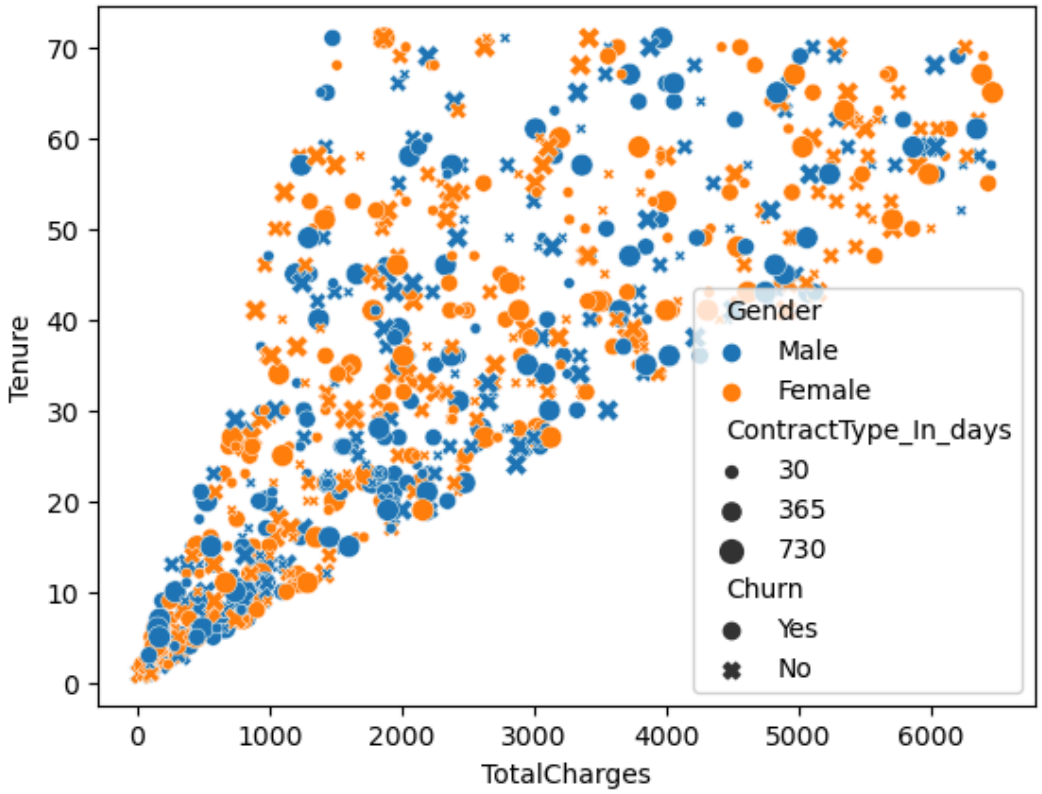
Numerical and Numerical

In [163]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 4364 entries, 0 to 4649
Data columns (total 12 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   CustomerID            4364 non-null   int64  
 1   Age                   4364 non-null   float64
 2   Gender                4364 non-null   object 
 3   ContractType_In_days  4364 non-null   int64  
 4   MonthlyCharges        4364 non-null   float64
 5   TotalCharges          4364 non-null   float64
 6   TechSupport           4364 non-null   object 
 7   InternetService       4364 non-null   object 
 8   Tenure                4364 non-null   int64  
 9   PaperlessBilling      4364 non-null   object 
 10  PaymentMethod         4364 non-null   object 
 11  Churn                 4364 non-null   object 
dtypes: float64(3), int64(3), object(6)
memory usage: 443.2+ KB
```

In [174]:
```
sns.scatterplot(data=df.sample(700),x='TotalCharges',y='Tenure',hue='Gender',style='Ch
```

Out[174]: <Axes: xlabel='TotalCharges', ylabel='Tenure'>



In [175]:
```
data = df
```

In [176]:
```
data.to_csv('EDA_Customer.csv')
```