```python
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from pandas.plotting import lag_plot
from pandas import datetime
from statsmodels.tsa.arima_model import ARIMA

from sklearn.metrics import mean_absolute_error,mean_squared_error
from math import sqrt
import joblib


%matplotlib inline
```

```
<ipython-input-1-78cbe58f2cf5>:5: FutureWarning: The pandas.datetime class is d
eprecated and will be removed from pandas in a future version. Import from date
time module instead.
    from pandas import datetime
```

In [2]:
```python
pip install pmdarima
```

```
Requirement already satisfied: pmdarima in c:\programdata\anaconda3\lib\site-pa
ckages (1.8.4)
Requirement already satisfied: statsmodels!=0.12.0,>=0.11 in c:\programdata\ana
conda3\lib\site-packages (from pmdarima) (0.12.2)
Requirement already satisfied: numpy>=1.19.3 in c:\programdata\anaconda3\lib\si
te-packages (from pmdarima) (1.20.1)
Requirement already satisfied: joblib>=0.11 in c:\programdata\anaconda3\lib\sit
e-packages (from pmdarima) (1.0.1)
Requirement already satisfied: pandas>=0.19 in c:\programdata\anaconda3\lib\sit
e-packages (from pmdarima) (1.2.4)
Requirement already satisfied: Cython!=0.29.18,>=0.29 in c:\programdata\anacond
a3\lib\site-packages (from pmdarima) (0.29.23)
Requirement already satisfied: urllib3 in c:\programdata\anaconda3\lib\site-pac
kages (from pmdarima) (1.26.4)
Requirement already satisfied: setuptools!=50.0.0,>=38.6.0 in c:\programdata\an
aconda3\lib\site-packages (from pmdarima) (52.0.0.post20210125)
Requirement already satisfied: scipy>=1.3.2 in c:\programdata\anaconda3\lib\sit
e-packages (from pmdarima) (1.6.2)
Requirement already satisfied: scikit-learn>=0.22 in c:\programdata\anaconda3\l
ib\site-packages (from pmdarima) (0.24.1)
Requirement already satisfied: pytz>=2017.3 in c:\programdata\anaconda3\lib\sit
e-packages (from pandas>=0.19->pmdarima) (2021.1)
Requirement already satisfied: python-dateutil>=2.7.3 in c:\programdata\anacond
a3\lib\site-packages (from pandas>=0.19->pmdarima) (2.8.1)
Requirement already satisfied: six>=1.5 in c:\programdata\anaconda3\lib\site-pa
ckages (from python-dateutil>=2.7.3->pandas>=0.19->pmdarima) (1.15.0)
Requirement already satisfied: threadpoolctl>=2.0.0 in c:\programdata\anaconda3
\lib\site-packages (from scikit-learn>=0.22->pmdarima) (2.1.0)
Requirement already satisfied: patsy>=0.5 in c:\programdata\anaconda3\lib\site-
packages (from statsmodels!=0.12.0,>=0.11->pmdarima) (0.5.1)
Note: you may need to restart the kernel to use updated packages.
```

In [3]:
```python
df=pd.read_csv("https://eodhistoricaldata.com/api/eod/MCD.US?api_token=OeAFFmMliP
```

In [4]:
```python
df.head()
```

Out[4]:

	Date	Open	High	Low	Close	Adjusted_close	Volume
0	1984-11-05	52.8760	52.8760	51.5632	52.8760	1.5029	5421600.0
1	1984-11-06	53.6256	53.6256	52.6872	53.6256	1.5243	5148000.0
2	1984-11-07	53.3752	53.7504	53.1880	53.3752	1.5171	3976200.0
3	1984-11-08	52.7496	52.9384	52.5624	52.7496	1.4994	3996000.0
4	1984-11-09	52.1248	53.6256	52.1248	52.1248	1.4816	3029400.0

In [5]:
```python
df.tail()
```

Out[5]:

	Date	Open	High	Low	Close	Adjusted_close	Volume
9337	2021-11-19	253.29	253.32	250.23	251.95	251.95	2743100.0
9338	2021-11-22	252.67	255.45	252.21	253.48	253.48	2438700.0
9339	2021-11-23	254.81	255.79	253.05	255.65	255.65	2770000.0
9340	2021-11-24	254.50	257.79	254.05	257.11	257.11	2642800.0
9341	483665	NaN	NaN	NaN	NaN	NaN	NaN

In [6]:
```python
type(df['Date'][0])
```

Out[6]: str

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

Out[7]:

	Date	Open	High	Low	Close	Adjusted_close	Volume
0	1984-11-05	52.8760	52.8760	51.5632	52.8760	1.5029	5421600.0
1	1984-11-06	53.6256	53.6256	52.6872	53.6256	1.5243	5148000.0
2	1984-11-07	53.3752	53.7504	53.1880	53.3752	1.5171	3976200.0
3	1984-11-08	52.7496	52.9384	52.5624	52.7496	1.4994	3996000.0
4	1984-11-09	52.1248	53.6256	52.1248	52.1248	1.4816	3029400.0

In [8]:
```python
df.set_index('Date',inplace=True,drop=False)
```

In [9]:
```python
df.dropna(inplace=True)
```

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

Out[10]:

	Date	Open	High	Low	Close	Adjusted_close	Volume
Date							
1984-11-05	1984-11-05	52.8760	52.8760	51.5632	52.8760	1.5029	5421600.0
1984-11-06	1984-11-06	53.6256	53.6256	52.6872	53.6256	1.5243	5148000.0
1984-11-07	1984-11-07	53.3752	53.7504	53.1880	53.3752	1.5171	3976200.0
1984-11-08	1984-11-08	52.7496	52.9384	52.5624	52.7496	1.4994	3996000.0
1984-11-09	1984-11-09	52.1248	53.6256	52.1248	52.1248	1.4816	3029400.0

In [11]: `df.describe()`

Out[11]:

	Open	High	Low	Close	Adjusted_close	Volume
count	9341.000000	9341.000000	9341.000000	9341.000000	9341.000000	9.341000e+03
mean	72.844069	73.467777	72.222533	72.864849	47.778202	4.992217e+06
std	52.428946	52.758958	52.093806	52.428143	59.111688	3.154898e+06
min	12.420000	12.550000	12.120000	12.380000	1.431900	5.052000e+05
25%	35.150000	35.500000	34.750000	35.187500	7.789300	3.030400e+06
50%	54.000000	54.625000	53.375000	54.000000	19.302000	4.244521e+06
75%	93.700000	94.230000	93.140000	93.710000	72.594800	6.064500e+06
max	254.810000	257.790000	254.620000	257.110000	257.110000	8.698130e+07

```
In [12]: plt.figure()
         lag_plot(df['Close'],lag=3)
         plt.title('BSE Sensex -Autocorrelation plot with lag = 3')
         plt.show()
```

BSE Sensex -Autocorrelation plot with lag = 3
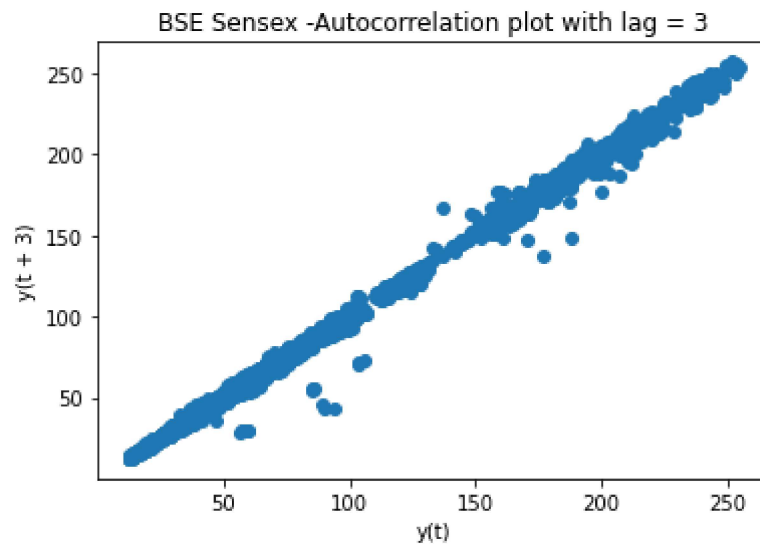


```
In [13]: plt.figure(figsize=(15,6))
         plt.plot(df["Close"])
         plt.title('BSE Sensex stock price over time')
         plt.xlabel("time")
         plt.ylabel("price")
         plt.show()
```

BSE Sensex stock price over time
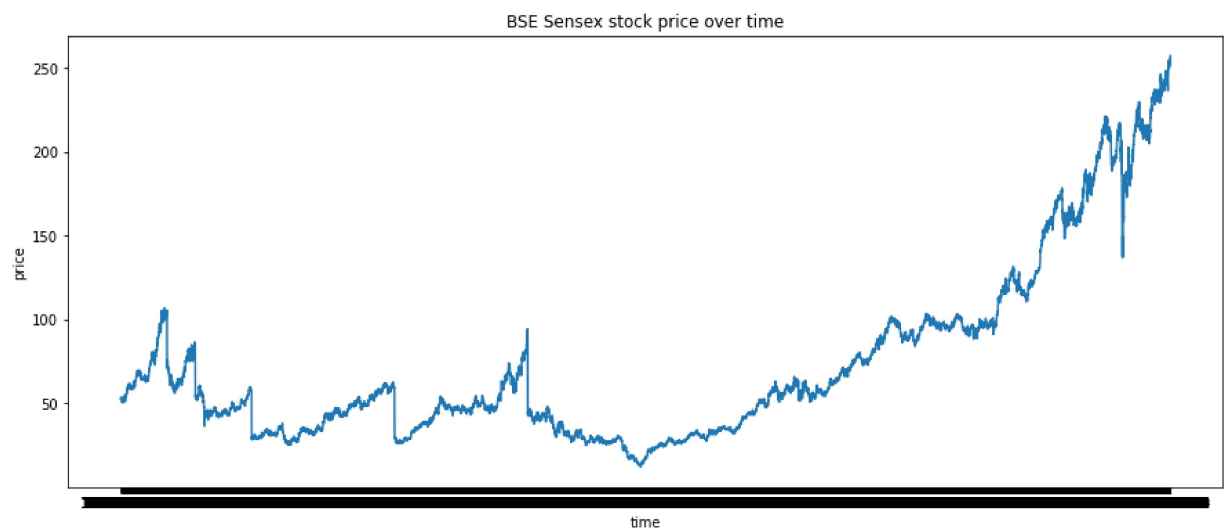
In [14]:
```python
train_data,test_data=df[:int(len(df)*0.9)],df[int(len(df)*0.9):]
plt.figure(figsize=(10,6))
plt.grid(True)
plt.xlabel('Dates')
plt.ylabel('Closing Prices')
plt.plot(df['Close'],'green',label='Train data')
plt.plot(test_data['Close'],'blue',label='Test data')
plt.legend()
```

Out[14]: <matplotlib.legend.Legend at 0x244a7811760>
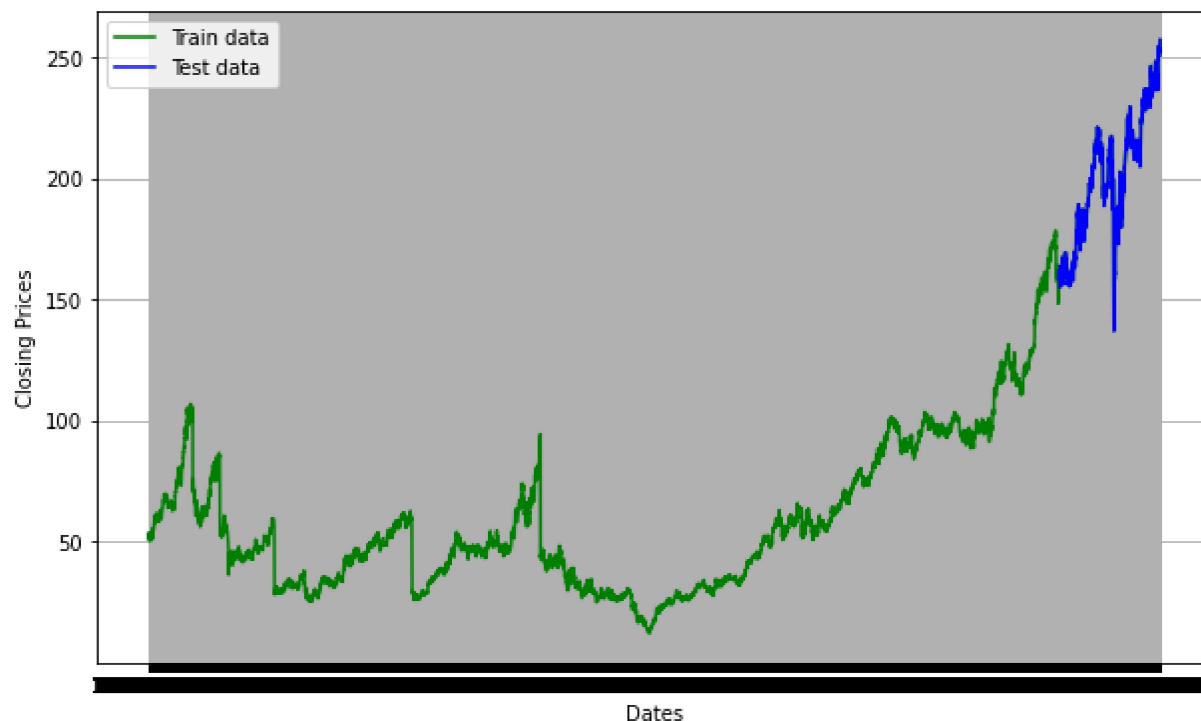
```python
model_autoARIMA=auto_arima(train_data['Close'],start_p=0,start_q=0)
test='adf'
max_p= 3,max_q=3,
m=1;
d=None,
seasonal=False,
start_p=0,
D=0,
trace=True,
error_action='ignore',
suppress_warnings=True,
stepwise=True
print(model_autoARIMA.summary())
```

```
  File "<ipython-input-15-acbab75231b7>", line 3
    max_p= 3,max_q=3,
            ^
SyntaxError: cannot assign to literal
```

In [ ]:
```python
model=ARIMA(train_data['Close'],order=(0,1,1))
fitted=model.fit(disp=-1)
print(fitted.summary())
```

In [ ]:
```python
fc, se, conf = fitted.forecast (368, alpha=0.05) # 95% confidence fc_series pd.Se
fc_series= pd.Series(fc,index=test_data.index)
lower_series= pd.Series(conf[:, 0], index=test_data.index)
upper_series=pd.Series (conf[:, 1], inde=test_data.index)
plt.figure(figsize=(12,5), dpi=100)

plt.plot(train_data[ 'Close'], label="training")
plt.plot(test_data[ 'Close '], color = 'blue', label='Actual Stock Price')

plt.plot(fc_series, color=' orange', label= 'Predicted Stock Price')
plt.fill_between(lower_series.index, lower_series, upper_series,
            color='k', alpha=.10)

plt.title('BSE Sensex Stock Price Prediction')

plt.xlabel('Time')

plt.ylabel('Actual Stock Price')

plt.legend (loc='upper left', fontsize=8)
plt.show()
```

In [ ]:
```python
stock1=df["Close"].copy()
stock1=pd.DataFrame(stock1)
```

In [ ]:
```python
stock1
```

```python
from sklearn.preprocessing import MinMaxScaler
scaler=MinMaxScaler(feature_range=(0,1))
df1=scaler.fit_transform(stock1)
```

```python
df1.shape
```

```python

```

```python
train_size,test_size
```

```python

```

```python

```