In [1]:
```
#19BEC096_Neel Patel Stock Market Prediction
```

In [2]:
```
#importing library and loading the dataset

#import packages
import pandas as pd
import numpy as np

#to plot within notebook
import matplotlib.pyplot as plt
%matplotlib inline

#setting figure size
from matplotlib.pylab import rcParams
rcParams['figure.figsize'] = 20,10

# To bring all values in specific range

#for normalizing data
from sklearn.preprocessing import MinMaxScaler
scaler = MinMaxScaler(feature_range=(0, 1))

#read the file
df = pd.read_csv(r'C:\Users\DELL\Desktop\ML Assignment\NSE-TATAGLOBAL11.csv')


#It shows frist 5 entries
#print the head
df.head()
```

Out[2]:

	Date	Open	High	Low	Last	Close	Total Trade Quantity	Turnover (Lacs)
0	2018-10-08	208.00	222.25	206.85	216.00	215.15	4642146.0	10062.83
1	2018-10-05	217.00	218.60	205.90	210.25	209.20	3519515.0	7407.06
2	2018-10-04	223.50	227.80	216.15	217.25	218.20	1728786.0	3815.79
3	2018-10-03	230.00	237.50	225.75	226.45	227.60	1708590.0	3960.27
4	2018-10-01	234.55	234.60	221.05	230.30	230.90	1534749.0	3486.05

In [3]:
```
len(df)
```

Out[3]:
```
1235
```

In [4]:
```
#selcting target variable=closing price for profit and loss
#covert in time format
#setting index as date
df['Date'] = pd.to_datetime(df.Date,format='%Y-%m-%d')
df.index = df['Date']

#plot
plt.figure(figsize=(16,8))
plt.plot(df['Close'], label='Close Price history')
```

Out[4]:
```
[<matplotlib.lines.Line2D at 0x1aab098f670>]
```

In [5]:
```
!pip install fastai
```

```
Requirement already satisfied: fastai in c:\users\dell\anaconda3\lib\site-packa
ges (2.5.6)
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```

In [6]:
```
#setting index as date values
df['Date'] = pd.to_datetime(df.Date,format='%Y-%m-%d')
df.index = df['Date']

#sorting based on date time
data = df.sort_index(ascending=True, axis=0)

#creating a separate dataset [data is doubled here]
new_data = pd.DataFrame(index=range(0,len(df)),columns=['Date', 'Close'])

for i in range(0,len(data)):
    new_data['Date'][i] = data['Date'][i]
    new_data['Close'][i] = data['Close'][i]

!pip install fastai

#create feature
from fastai.tabular.core import  add_datepart
add_datepart(new_data, 'Date')
new_data.drop('Elapsed', axis=1, inplace=True)  #elapsed will be the time stamp
```

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Requirement already satisfied: fastai in c:\users\dell\anaconda3\lib\site-pa
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a3\lib\site-packages (from scikit-learn->fastai) (2.2.0)
```

Linear Regression

In [7]:
```
#setting index as date values
df['Date'] = pd.to_datetime(df.Date,format='%Y-%m-%d')
df.index = df['Date']

#sorting
data = df.sort_index(ascending=True, axis=0)

#creating a separate dataset
new_data = pd.DataFrame(index=range(0,len(df)),columns=['Date', 'Close'])

for i in range(0,len(data)):
    new_data['Date'][i] = data['Date'][i]
    new_data['Close'][i] = data['Close'][i]
```

In [8]:
```
#It decide month end/start,quarter end/start,year end/start based on date and tie
#create features
from fastai.tabular.core import  add_datepart
add_datepart(new_data, 'Date')
new_data.drop('Elapsed', axis=1, inplace=True)  #elapsed will be the time stamp
```

In [9]:
```
new_data
```

Out[9]:

	Close	Year	Month	Week	Day	Dayofweek	Dayofyear	Is_month_end	Is_month_start	Is_c
0	155.8	2013	10	41	8	1	281	False	False	
1	155.55	2013	10	41	9	2	282	False	False	
2	160.15	2013	10	41	10	3	283	False	False	
3	160.05	2013	10	41	11	4	284	False	False	
4	159.45	2013	10	42	14	0	287	False	False	
...	...	...	...	...	...	...	...	...	...	
1230	230.9	2018	10	40	1	0	274	False	True	
1231	227.6	2018	10	40	3	2	276	False	False	
1232	218.2	2018	10	40	4	3	277	False	False	
1233	209.2	2018	10	40	5	4	278	False	False	
1234	215.15	2018	10	41	8	0	281	False	False	

1235 rows × 13 columns

In [10]:
```
new_data.loc[:,'mon_fri'] = 0
for i in range(0,len(new_data)):
    if (new_data.iloc[i,5] == 0 or new_data.iloc[i,5] == 4):
        new_data.iloc[i,5] = 1
    else:
        new_data.iloc[i,5] = 0
```

In [11]:
```
len(new_data)
```

Out[11]: 1235

In [12]:
```
#split into train and validation
train = new_data[:987]
valid = new_data[987:]
#removing close from i/p
x_train = train.drop('Close', axis=1)
#close in o/p
y_train = train['Close']
x_valid = valid.drop('Close', axis=1)
y_valid = valid['Close']
#implement linear regression
from sklearn.linear_model import LinearRegression
model = LinearRegression()
model.fit(x_train,y_train)
```

Out[12]: LinearRegression()

In [13]:
```
#make predictions and find the rmse
preds = model.predict(x_valid)
rms=np.sqrt(np.mean(np.power((np.array(y_valid)-np.array(preds)),2)))
rms
```

Out[13]:
```
121.14886907601948
```

In [14]:
```
#to convert simple array to dataframe
valid=pd.DataFrame(valid)
```

In [15]:
```
len(preds)
```

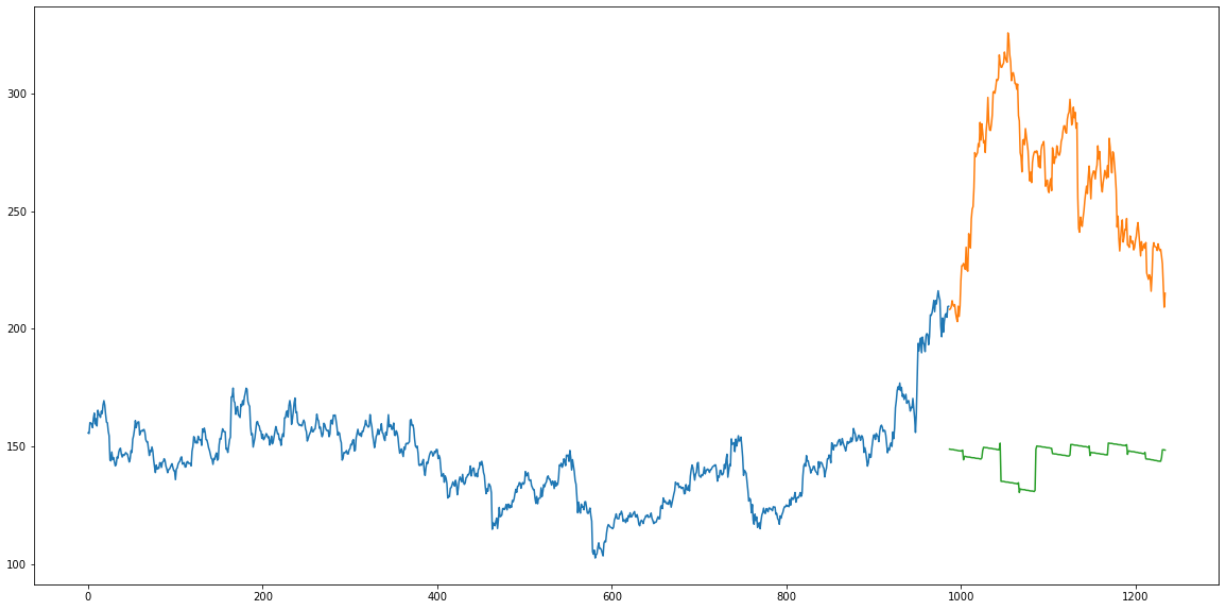
Out[15]:
```
248
```

In [16]:
```
#plot
# valid.loc['Predictions'] = 0
valid['Predictions'] = preds

valid.index = new_data[987:].index
train.index = new_data[:987].index

plt.plot(train['Close'])
plt.plot(valid[['Close', 'Predictions']])
```

Out[16]:
```
[<matplotlib.lines.Line2D at 0x1aab4c64940>,
 <matplotlib.lines.Line2D at 0x1aab4c649d0>]
```



KNN

In [17]:
```
#importing libraries
from sklearn import neighbors
from sklearn.model_selection import GridSearchCV
from sklearn.preprocessing import MinMaxScaler
scaler = MinMaxScaler(feature_range=(0, 1))
```

In [18]:
```
#scaling data
x_train_scaled = scaler.fit_transform(x_train)
x_train = pd.DataFrame(x_train_scaled)
x_valid_scaled = scaler.fit_transform(x_valid)
x_valid = pd.DataFrame(x_valid_scaled)

#using gridsearch to find the best parameter
#Best of all neigbors will be taken in model parameter
params = {'n_neighbors':[2,3,4,5,6,7,8,9]}
knn = neighbors.KNeighborsRegressor()
model = GridSearchCV(knn, params, cv=5)

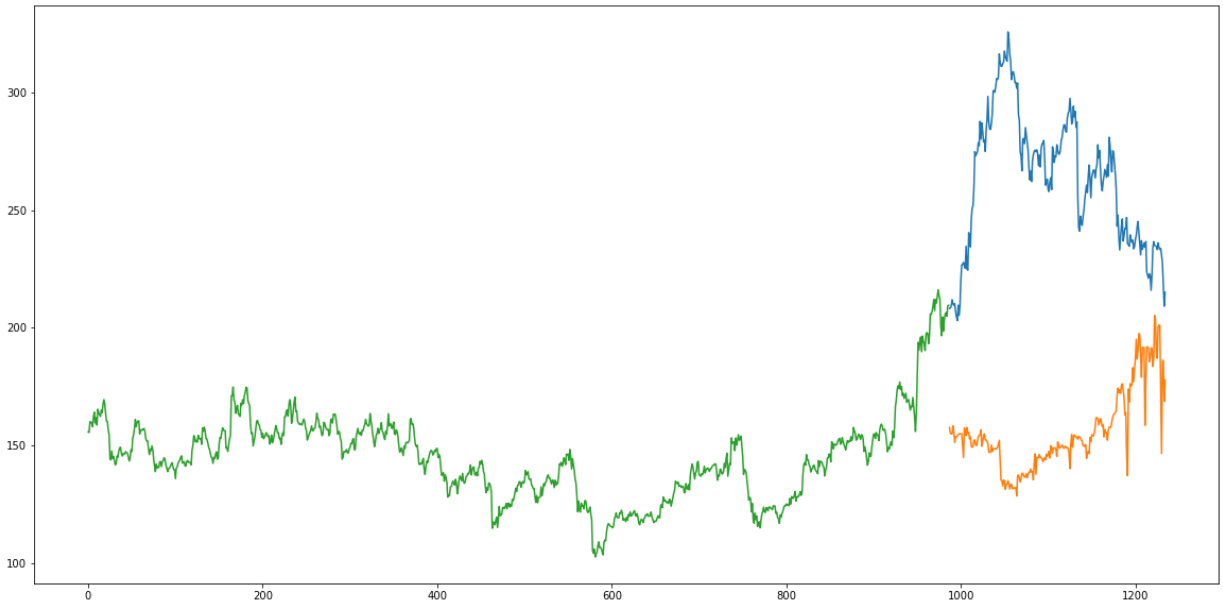
#fit the model and make predictions
model.fit(x_train,y_train)
preds = model.predict(x_valid)
```

In [19]:
```
#rmse
rms=np.sqrt(np.mean(np.power((np.array(y_valid)-np.array(preds)),2)))
rms
```

Out[19]:
```
114.46110018547813
```

In [20]:
```
#plot
valid['Predictions'] = 0
valid['Predictions'] = preds
plt.plot(valid[['Close', 'Predictions']])
plt.plot(train['Close'])
```

Out[20]:
```
[<matplotlib.lines.Line2D at 0x1aab4dba2b0>]
```



Random Forest Regressor

In [21]:
```
from sklearn.ensemble import RandomForestRegressor

 # create regressor object
regressor = RandomForestRegressor(n_estimators = 100, random_state = 0)

# fit the regressor with x and y data
regressor.fit(x_train, y_train)
```

Out[21]:
```
RandomForestRegressor(random_state=0)
```

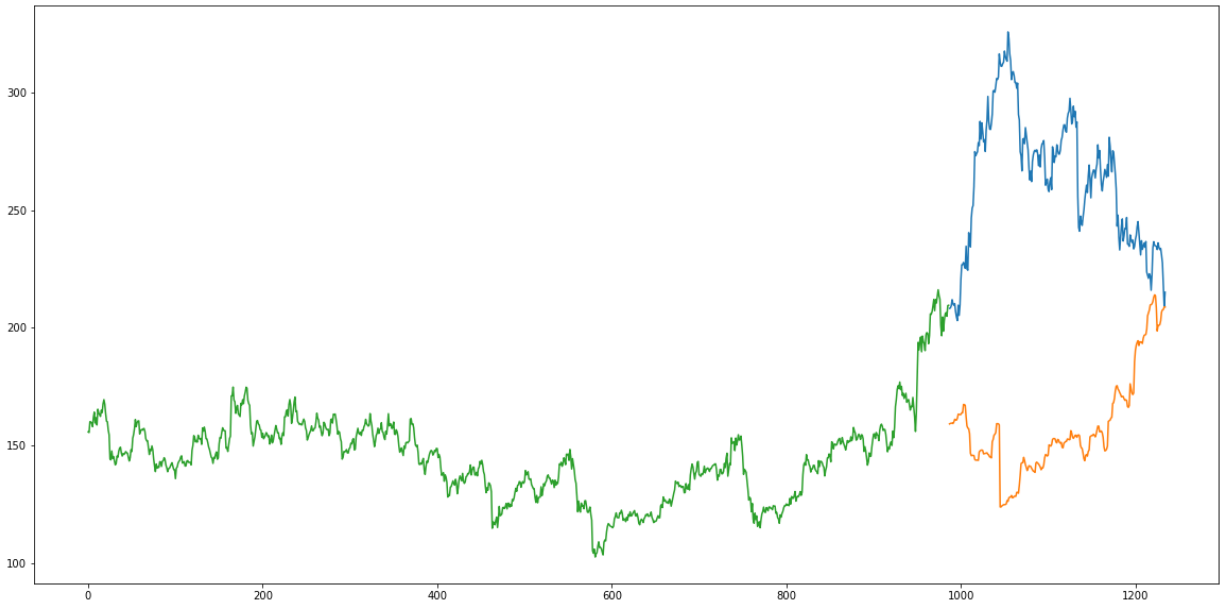
In [22]:
```
y_pred = regressor.predict(x_valid)
```

In [23]:
```
#rmse
rms=np.sqrt(np.mean(np.power((np.array(y_valid)-np.array(y_pred)),2)))
rms
```

Out[23]:
```
114.26387670342436
```

In [24]:
```
#plot
valid['Predictions'] = 0
valid['Predictions'] = y_pred
plt.plot(valid[['Close', 'Predictions']])
plt.plot(train['Close'])
```

Out[24]:
```
[<matplotlib.lines.Line2D at 0x1aab64667c0>]
```



LSTM

In [25]:
```
#1)Forget Gate
#2)Update Gate
#3)Output Gate
#importing required libraries

from sklearn.preprocessing import MinMaxScaler
from keras.models import Sequential
from keras.layers import Dense, Dropout, LSTM

#creating dataframe
data = df.sort_index(ascending=True, axis=0)
new_data = pd.DataFrame(index=range(0,len(df)),columns=['Date', 'Close'])
for i in range(0,len(data)):
    new_data['Date'][i] = data['Date'][i]
    new_data['Close'][i] = data['Close'][i]

#setting index
#Setting index and also dropping date as LSTM is continous type of model so no ne
new_data.index = new_data.Date
new_data.drop('Date', axis=1, inplace=True)

#creating train and test sets
dataset = new_data.values

train = dataset[0:987,:]
valid = dataset[987:,:]

#converting dataset into x_train and y_train
scaler = MinMaxScaler(feature_range=(0, 1))
scaled_data = scaler.fit_transform(dataset)

x_train, y_train = [], []
#Some part of data are fitted into X and Y training
for i in range(60,len(train)):
    x_train.append(scaled_data[i-60:i,0])
    y_train.append(scaled_data[i,0])
x_train, y_train = np.array(x_train), np.array(y_train)

x_train = np.reshape(x_train, (x_train.shape[0],x_train.shape[1],1))

# create and fit the LSTM network
model = Sequential()
#50 Recurrent unit
model.add(LSTM(units=50, return_sequences=True, input_shape=(x_train.shape[1],1)))
model.add(LSTM(units=50))
model.add(Dense(1))

model.compile(loss='mean_squared_error', optimizer='adam')
model.fit(x_train, y_train, epochs=1, batch_size=1, verbose=2)

#predicting 246 values, using past 60 from the train data
inputs = new_data[len(new_data) - len(valid) - 60:].values
inputs = inputs.reshape(-1,1)
inputs  = scaler.transform(inputs)

X_test = []
```

```
for i in range(60,inputs.shape[0]):
    X_test.append(inputs[i-60:i,0])
X_test = np.array(X_test)

X_test = np.reshape(X_test, (X_test.shape[0],X_test.shape[1],1))
closing_price = model.predict(X_test)
closing_price = scaler.inverse_transform(closing_price)
```

```
927/927 - 29s - loss: 0.0011 - 29s/epoch - 31ms/step
```

In [26]:
```
rms=np.sqrt(np.mean(np.power((valid-closing_price),2)))
rms
```

Out[26]:
```
9.023592813585678
```

In [27]:
```
#for plotting
train = new_data[:987]
valid = new_data[987:]
valid=pd.DataFrame(valid)
valid['Predictions'] = closing_price
plt.plot(train['Close'])
plt.plot(valid[['Close','Predictions']])
```

Out[27]:
```
[<matplotlib.lines.Line2D at 0x1aac9c62b80>,
 <matplotlib.lines.Line2D at 0x1aac9c62c10>]
```