Predict the stock price using Elastic Net Regression

In [4]:

```
# Import libraries

import yfinance as yf
```

In [6]:

```
# Download the data from Yahoo Finance

tickers = ['AAPL', 'AMZN', 'MSFT', 'QQQ', '^GSPC']
df = yf.download(tickers, start = '2020-01-01', end = '2025-04-01')['Close']
df.head()
```

```
C:\Users\sahil\AppData\Local\Temp\ipykernel_28096\178316247.py:4: FutureWarning: YF.
download() has changed argument auto_adjust default to True
  df = yf.download(tickers, start = '2020-01-01', end = '2025-04-01')['Close']
[*********************100%***********************]  5 of 5 completed
```

Out[6]:

Ticker	AAPL	AMZN	MSFT	QQQ	^GSPC
Date					
2020-01-02	72.538521	94.900497	152.791107	208.848969	3257.850098
2020-01-03	71.833290	93.748497	150.888611	206.935928	3234.850098
2020-01-06	72.405670	95.143997	151.278625	208.269287	3246.280029
2020-01-07	72.065147	95.343002	149.899338	208.240265	3237.179932
2020-01-08	73.224403	94.598503	152.286957	209.805466	3253.050049

In [8]:

```
# Feature Engineering

df['AAPL(t-1)'] = df['AAPL'].shift(1)
df['AMZN(t-1)'] = df['AMZN'].shift(1)
df['MSFT(t-1)'] = df['MSFT'].shift(1)
df['QQQ(t-1)'] = df['QQQ'].shift(1)
df['^GSPC(t-1)'] = df['^GSPC'].shift(1)
```

In [10]:

```
df['AAPL(MA_5)'] = df['AAPL'].rolling(window=5).mean()
df['AMZN(MA_5)'] = df['AMZN'].rolling(window=5).mean()
df['MSFT(MA_5)'] = df['MSFT'].rolling(window=5).mean()
df['QQQ(MA_5)'] = df['QQQ'].rolling(window=5).mean()
df['^GSPC(MA_5)'] = df['^GSPC'].rolling(window=5).mean()
```

In [12]:

```
df['Target'] = df['AAPL'].shift(-1)
df.head()
```

Out[12]:

Ticker	AAPL	AMZN	MSFT	QQQ	^GSPC	AAPL(t-1)	AMZN(t-1)	M
Date								
2020-01-02	72.538521	94.900497	152.791107	208.848969	3257.850098	NaN	NaN	
2020-01-03	71.833290	93.748497	150.888611	206.935928	3234.850098	72.538521	94.900497	15
2020-01-06	72.405670	95.143997	151.278625	208.269287	3246.280029	71.833290	93.748497	15
2020-01-07	72.065147	95.343002	149.899338	208.240265	3237.179932	72.405670	95.143997	15
2020-01-08	73.224403	94.598503	152.286957	209.805466	3253.050049	72.065147	95.343002	14

In [14]:

```
df = df.dropna()
```

In [16]:

```
# Steps for Elastic Net Regression

# 1. Import libraries
# 2. Define features and Target variables
# 3. Train Test split data
# 4. Apply Elastic Net Regression
# 5. Get Intercept & co-eff for Elastic Net Regression
# 6. Predict using Elastic Net Regression
# 7. Create a dataframe with Actual and Predicted values
# 8. Plot the graph between Actual and Predicted Prices
# 9. Evaluate the model - R Square, Mse, RMSE
```

In [24]:

```
# 1. Import libraries

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.linear_model import ElasticNet
from sklearn.model_selection import train_test_split
from sklearn.metrics import r2_score, mean_squared_error
```

In [26]:

```
# 2. Define features and Target variables

X = df[ ['AAPL(t-1)', 'AMZN(t-1)',
       'MSFT(t-1)', 'QQQ(t-1)', '^GSPC(t-1)', 'AAPL(MA_5)', 'AMZN(MA_5)',
       'MSFT(MA_5)', 'QQQ(MA_5)', '^GSPC(MA_5)' ] ]

Y = df['Target']
```

In [28]:

```
# 3. Train Test split data
```

```
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size = 0.05, shuffle
```

In [48]:

```
# 4. Apply Elastic Net Regression

elastic_net = ElasticNet(alpha = 1, l1_ratio = 0.5)
elastic_net.fit(X_train, Y_train)
```

```
C:\Users\sahil\anaconda3\Lib\site-packages\sklearn\linear_model\_coordinate_descent.
py:697: ConvergenceWarning: Objective did not converge. You might want to increase t
he number of iterations, check the scale of the features or consider increasing regu
larisation. Duality gap: 6.450e+03, tolerance: 2.120e+02
  model = cd_fast.enet_coordinate_descent(
```

Out[48]:

```
▾ ElasticNet ⓘ ?
ElasticNet(alpha=1)
```

In [50]:

```
# 5. Get Intercept & co-eff for Elastic Net Regression

co_eff = elastic_net.coef_
intercept = elastic_net.intercept_

co_effi = pd.DataFrame( { 'Features': X.columns, 'Co_eff': co_eff} )
co_effi
```

Out[50]:

	Features	Co_eff
0	AAPL(t-1)	0.529474
1	AMZN(t-1)	0.000297
2	MSFT(t-1)	0.010726
3	QQQ(t-1)	0.002963
4	^GSPC(t-1)	0.006583
5	AAPL(MA_5)	0.447737
6	AMZN(MA_5)	0.000000
7	MSFT(MA_5)	0.000000
8	QQQ(MA_5)	0.000000
9	^GSPC(MA_5)	-0.006781

In [52]:

```
# 6. Predict using Elastic Net Regression

y_pred = elastic_net.predict(X_test)
y_pred
```

Out[52]:

```
array([248.90269733, 252.32445673, 253.4565508 , 256.25687319,
       257.03549839, 254.51186561, 251.91316406, 249.71050403,
       244.85586431, 244.2095854 , 244.46386541, 241.7288177 ,
       241.50334709, 237.07637353, 234.95432112, 233.94690454,
       235.90808318, 229.88210732, 229.91646239, 225.22141699,
       224.80672597, 224.2275804 , 223.5790595 , 227.95087851,
       234.35522787, 236.00096817, 236.25299378, 235.0707531 ,
       230.04930367, 232.25239997, 231.84200896, 231.69187735,
       228.16891827, 228.58926991, 231.64449614, 234.47709482,
       238.81072319, 241.82985183, 242.86719727, 243.94103481,
       244.78566003, 244.23259187, 245.25607938, 244.80774952,
       240.89364974, 238.28265512, 240.73530526, 237.15503241,
       235.3123123 , 235.78042702, 234.79380269, 236.32615701,
       227.91319842, 222.78091742, 218.97093384, 212.42124193,
       214.0596142 , 213.79139725, 212.36243304, 214.37706815,
       214.0660286 , 216.82736723, 219.60607379, 221.80401937,
       220.95317493, 222.13704928])
```

In [54]:

```python
# 7. Create a dataframe with Actual and Predicted values

last = pd.DataFrame( { 'Actual': Y_test, 'Predict': y_pred } )
last
```

Out[54]:

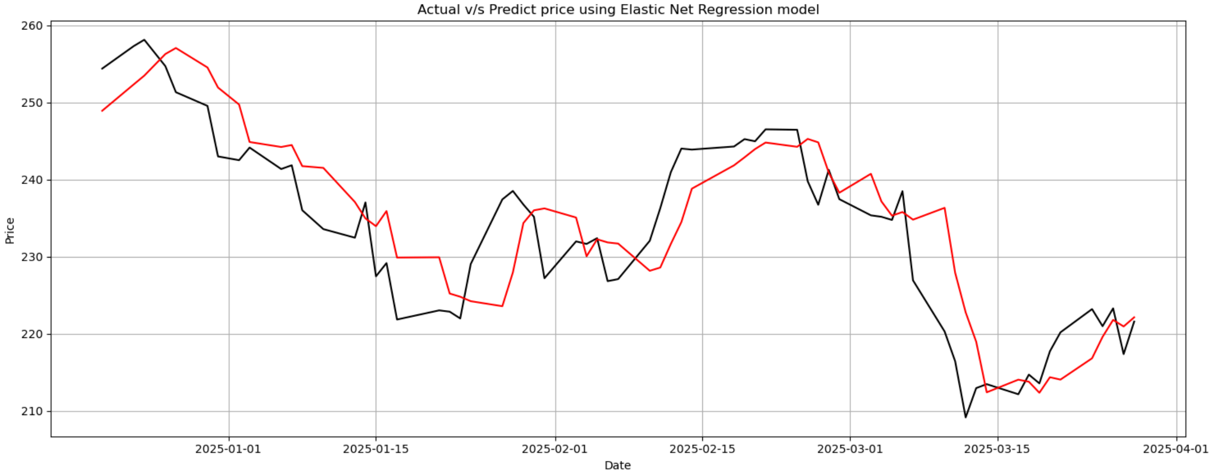
Date	Actual	Predict
2024-12-20	254.367035	248.902697
2024-12-23	257.286682	252.324457
2024-12-24	258.103729	253.456551
2024-12-26	254.685883	256.256873
2024-12-27	251.307861	257.035498
...	...	...
2025-03-24	223.203659	216.827367
2025-03-25	220.989059	219.606074
2025-03-26	223.303406	221.804019
2025-03-27	217.367935	220.953175
2025-03-28	221.587616	222.137049

66 rows × 2 columns

In [56]:

```python
# 8. Plot the graph between Actual and Predicted Prices

plt.figure(figsize = (15,6))
plt.plot(last.index, last['Actual'], label = 'Actual', color = 'Black')
plt.plot(last.index, last['Predict'], label = 'Predict', color = 'Red')
plt.title('Actual v/s Predict price using Elastic Net Regression model')
plt.xlabel('Date')
plt.ylabel('Price')
plt.grid(True)
plt.tight_layout()
plt.show()
```



In [58]:

```
# 9. Evaluate the model - R Square, MSE, RMSE

r2 = r2_score(Y_test, y_pred)
print('R2 =', r2)

mse = mean_squared_error(Y_test, y_pred)
print('MSE =', mse)

rmse = np.sqrt(mse)
print('RMSE =', rmse)
```

```
R2 = 0.7513322121619855
MSE = 35.00313196605993
RMSE = 5.9163444766223625
```

In [ ]: