In [73]:

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.linear_model import Ridge
from sklearn.linear_model import Lasso
from sklearn import metrics
```

In [74]:

```
# loading the data from csv file to pandas dataframe
car_dataset = pd.read_csv('/content/car data.csv', sep=';', error_bad_lines=False)
```

In [75]:

```
# inspecting the first 5 rows of the dataframe
car_dataset.head()
```

Out[75]:

	Car_Name	Year	Selling_Price	Present_Price	Kms_Driven	Fuel_Type	Seller_Type	Transmission	Owner
0	ritz	2014	3.35	5.59	27000	Petrol	Dealer	Manual	0
1	sx4	2013	4.75	9.54	43000	Diesel	Dealer	Manual	0
2	ciaz	2017	7.25	9.85	6900	Petrol	Dealer	Manual	0
3	wagon r	2011	2.85	4.15	5200	Petrol	Dealer	Manual	0
4	swift	2014	4.60	6.87	42450	Diesel	Dealer	Manual	0

In [76]:

```
# checking the number of rows and columns
car_dataset.shape
```

Out[76]:

```
(301, 9)
```

In [77]:

```
# getting some information about the dataset
car_dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 301 entries, 0 to 300
Data columns (total 9 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   Car_Name       301 non-null    object 
 1   Year           301 non-null    int64  
 2   Selling_Price  301 non-null    float64
 3   Present_Price  301 non-null    float64
 4   Kms_Driven     301 non-null    int64  
 5   Fuel_Type      301 non-null    object 
 6   Seller_Type    301 non-null    object 
 7   Transmission   301 non-null    object 
 8   Owner          301 non-null    int64  
dtypes: float64(2), int64(3), object(4)
memory usage: 21.3+ KB
```

In [78]:

```
# checking the number of missing values
car_dataset.isnull().sum()
```

Out[78]:

```
Car_Name         0
Year             0
Selling_Price    0
Present_Price    0
Kms_Driven       0
Fuel_Type        0
Seller_Type      0
Transmission     0
Owner            0
dtype: int64
```

In [79]:

```
# checking the distribution of categorical data
print(car_dataset.Fuel_Type.value_counts())
print(car_dataset.Seller_Type.value_counts())
print(car_dataset.Transmission.value_counts())
```

```
Petrol    239
Diesel     60
CNG         2
Name: Fuel_Type, dtype: int64
Dealer        195
Individual    106
Name: Seller_Type, dtype: int64
Manual       261
Automatic     40
Name: Transmission, dtype: int64
```

In [80]:

```
## Encoding the Categorical Data

# encoding "Fuel_Type" Column
car_dataset.replace({'Fuel_Type':{'Petrol':0,'Diesel':1,'CNG':2}},inplace=True)

# encoding "Seller_Type" Column
car_dataset.replace({'Seller_Type':{'Dealer':0,'Individual':1}},inplace=True)

# encoding "Transmission" Column
car_dataset.replace({'Transmission':{'Manual':0,'Automatic':1}},inplace=True)
```

In [81]:

```
car_dataset.head()
```

Out[81]:

	Car_Name	Year	Selling_Price	Present_Price	Kms_Driven	Fuel_Type	Seller_Type	Transmission	Owner
0	ritz	2014	3.35	5.59	27000	0	0	0	0
1	sx4	2013	4.75	9.54	43000	1	0	0	0
2	ciaz	2017	7.25	9.85	6900	0	0	0	0
3	wagon r	2011	2.85	4.15	5200	0	0	0	0
4	swift	2014	4.60	6.87	42450	1	0	0	0

In [82]:

```
## Splitting the data and Target

X = car_dataset.drop(['Car_Name','Selling_Price'],axis=1)
Y = car_dataset['Selling_Price']
```

In [83]:

```
print(X)
```

```
     Year  Present_Price  Kms_Driven  ...  Seller_Type  Transmission  Owner
0    2014           5.59       27000  ...            0             0      0
1    2013           9.54       43000  ...            0             0      0
2    2017           9.85        6900  ...            0             0      0
3    2011           4.15        5200  ...            0             0      0
4    2014           6.87       42450  ...            0             0      0
..    ...            ...         ...  ...          ...           ...    ...
296  2016          11.60       33988  ...            0             0      0
297  2015           5.90       60000  ...            0             0      0
298  2009          11.00       87934  ...            0             0      0
299  2017          12.50        9000  ...            0             0      0
300  2016           5.90        5464  ...            0             0      0

[301 rows x 7 columns]
```

In [84]:

```
print(Y)
```

```
0       3.35
1       4.75
2       7.25
3       2.85
4       4.60
       ...
296     9.50
297     4.00
298     3.35
299    11.50
300     5.30
Name: Selling_Price, Length: 301, dtype: float64
```

In [85]:

```
## Splitting Training and Test data
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size = 0.1, random_state=
2)
```

In [86]:

```
## Model Training
# Linear Regression

# loading the linear regression model
lin_reg_model = LinearRegression()
```

In [87]:

```
lin_reg_model.fit(X_train,Y_train)
```

Out[87]:

```
LinearRegression()
```

In [88]:

```
# Model Evaluation

# prediction on Training data
training_data_prediction = lin_reg_model.predict(X_train)
```

In [89]:

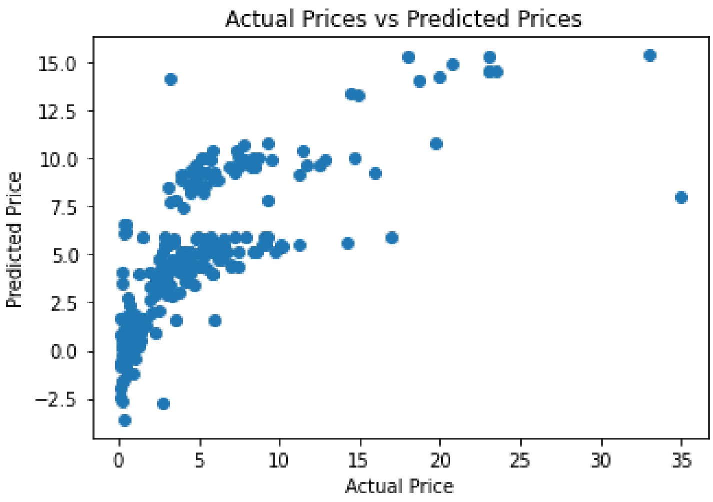
```
# R squared Error
error_score = metrics.r2_score(Y_train, training_data_prediction)
print("R squared Error : ", error_score)
```

```
R squared Error :  0.566994405148394
```

In [90]:

```
## Visualize the actual prices and Predicted prices

plt.scatter(Y_train, training_data_prediction)
plt.xlabel("Actual Price")
plt.ylabel("Predicted Price")
plt.title(" Actual Prices vs Predicted Prices")
plt.show()
```



In [91]:

```
# prediction on Training data
test_data_prediction = lin_reg_model.predict(X_test)
```

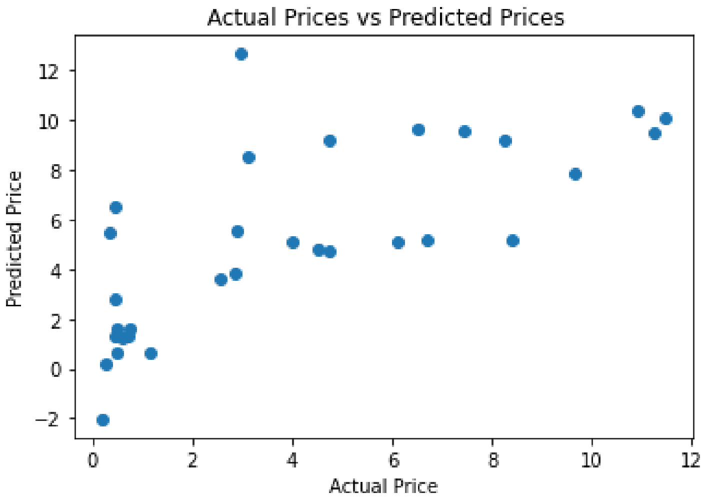
In [92]:

```
# R squared Error
error_score = metrics.r2_score(Y_test, test_data_prediction)
print("R squared Error : ", error_score)
```

```
R squared Error :  0.3415472061398922
```

In [93]:

```
plt.scatter(Y_test, test_data_prediction)
plt.xlabel("Actual Price")
plt.ylabel("Predicted Price")
plt.title(" Actual Prices vs Predicted Prices")
plt.show()
```



In [94]:

```
## Ridge Regresion

# loading the Ridge regression model
reg_model= Ridge()
```

In [95]:

```
reg_model.fit(X_train,Y_train)
```

Out[95]:

```
Ridge()
```

In [96]:

```
## Model Evaluation
# prediction on Training data
training_data_prediction = reg_model.predict(X_train)
```

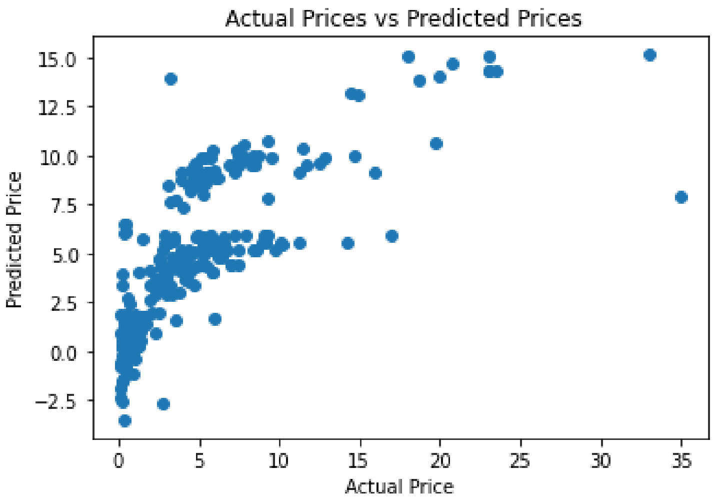
In [97]:

```
# R squared Error
error_score = metrics.r2_score(Y_train, training_data_prediction)
print("R squared Error : ", error_score)
```

```
R squared Error :  0.566828514760223
```

In [98]:

```
## Visualize the actual prices and Predicted prices
plt.scatter(Y_train, training_data_prediction)
plt.xlabel("Actual Price")
plt.ylabel("Predicted Price")
plt.title(" Actual Prices vs Predicted Prices")
plt.show()
```



In [99]:

```
# prediction on Training data
test_data_prediction = lass_reg_model.predict(X_test)
```

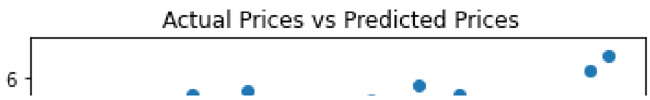
In [100]:

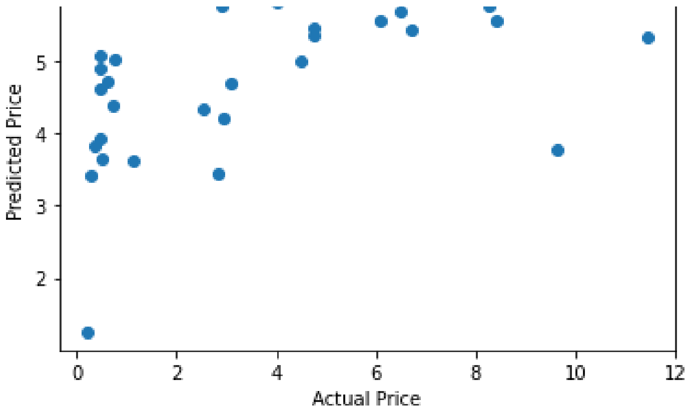
```
# R squared Error
error_score = metrics.r2_score(Y_test, test_data_prediction)
print("R squared Error : ", error_score)
```

```
R squared Error :  0.2215292119941218
```

In [101]:

```
plt.scatter(Y_test, test_data_prediction)
plt.xlabel("Actual Price")
plt.ylabel("Predicted Price")
plt.title(" Actual Prices vs Predicted Prices")
plt.show()
```





In [102]:

```
## Lasso Regresion

# loading the Lasso regression model
lasso_reg_model= Lasso()
```

In [103]:

```
lasso_reg_model.fit(X_train,Y_train)
```

Out[103]:

```
Lasso()
```

In [104]:

```
## Model Evaluation
# prediction on Training data
training_data_prediction = lasso_reg_model.predict(X_train)
```

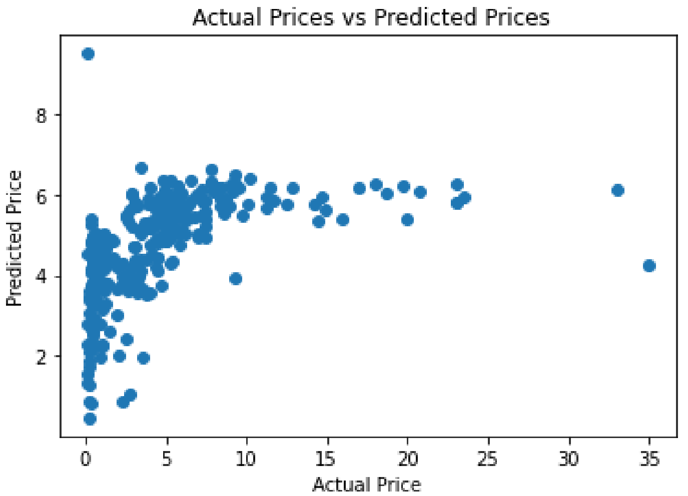
In [105]:

```
# R squared Error
error_score = metrics.r2_score(Y_train, training_data_prediction)
print("R squared Error : ", error_score)
```

```
R squared Error :  0.18123645068973693
```

In [106]:

```
## Visualize the actual prices and Predicted prices
plt.scatter(Y_train, training_data_prediction)
plt.xlabel("Actual Price")
plt.ylabel("Predicted Price")
plt.title(" Actual Prices vs Predicted Prices")
plt.show()
```



In [71]:

```
# prediction on Training data
test_data_prediction = lass_reg_model.predict(X_test)
```

In [107]:

```
# R squared Error
error_score = metrics.r2_score(Y_test, test_data_prediction)
print("R squared Error : ", error_score)
```

```
R squared Error :  0.2215292119941218
```

In [108]:

```
plt.scatter(Y_test, test_data_prediction)
plt.xlabel("Actual Price")
plt.ylabel("Predicted Price")
plt.title(" Actual Prices vs Predicted Prices")
plt.show()
```