4. Develop a linear regression model for forecasting time series data.

EX.N0 : 4	**DEVELOP A LINEAR REGRESSION MODEL FOR FORECASTING TIME SERIES DATA**
DATE : 29/03/2025	

AIM:

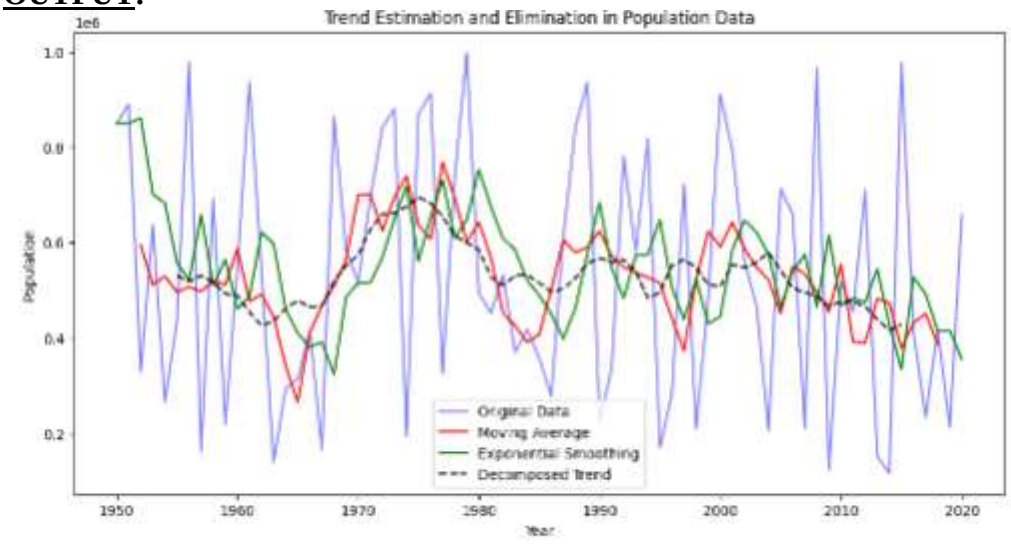
To Develop a linear regression model for forecasting time series data.

PROGRAM:

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


df = pd.read_csv("D:/221501507/TIME SERIES ANALYSIS AND FORECASTING/EX03/archive
(1) (1)/FINAL_USO.csv", parse_dates=["Date"])  # Replace with actual file

df = df.sort_values(by="Date")
df["Time_Index"] = np.arange(len(df))
X = df[["Time_Index"]]  # Features
y = df["Close"]  # Target (gold price)

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, shuffle=False)

model = LinearRegression()
model.fit(X_train, y_train)

y_pred = model.predict(X_test)

future_X = np.arange(len(df), len(df) + 30).reshape(-1, 1)  # Forecast next 30 days
future_y = model.predict(future_X)

mse = mean_squared_error(y_test, y_pred)
print(f"Mean Squared Error: {mse:.2f}")

plt.figure(figsize=(12, 6))
plt.plot(df["Date"], df["Close"], label="Actual Gold Price", color="blue")
plt.plot(df.iloc[len(X_train):]["Date"], y_pred, label="Predicted Gold Price", color="red")
plt.plot(pd.date_range(df["Date"].max(), periods=30, freq='D'), future_y,
        label="Forecasted Price", color="green", linestyle="dashed")
```

```
plt.xlabel("Date")
plt.ylabel("Gold Price")
plt.legend()
plt.title("Gold Price Forecasting using Linear Regression")
plt.xticks(rotation=45)
plt.show()
```

OUTPUT:




```
import pandas as pd
```

RESULT:

Thus, the program for Develop a linear regression model for forecasting time series data is executed successfully.