

7. Implement program for decomposing time series data into trend and seasonality

EX.N0 : 7	Implement program for decomposing time series data into trend and seasonality
<u>DATE : 07/04/2025</u>	

AIM:

To Implement program for decomposing time series data into trend and seasonality.

PROGRAM:

```
import pandas as pd
import matplotlib.pyplot as plt
from statsmodels.tsa.seasonal import seasonal_decompose

file_path = r"D:\221501507\TIME SERIES ANALYSIS AND FORECASTING\EX03\archive (1)
(1)\FINAL_USO.csv"
df = pd.read_csv(file_path, parse_dates=['Date'], index_col='Date')

df.columns = df.columns.str.strip()

print("\n Available columns:", df.columns)
target_col = "Adj Close"
if target_col not in df.columns:
    raise ValueError(f"'{target_col}' column not found in the dataset.")

ts = df[target_col].dropna()

result = seasonal_decompose(ts, model='additive', period=30)

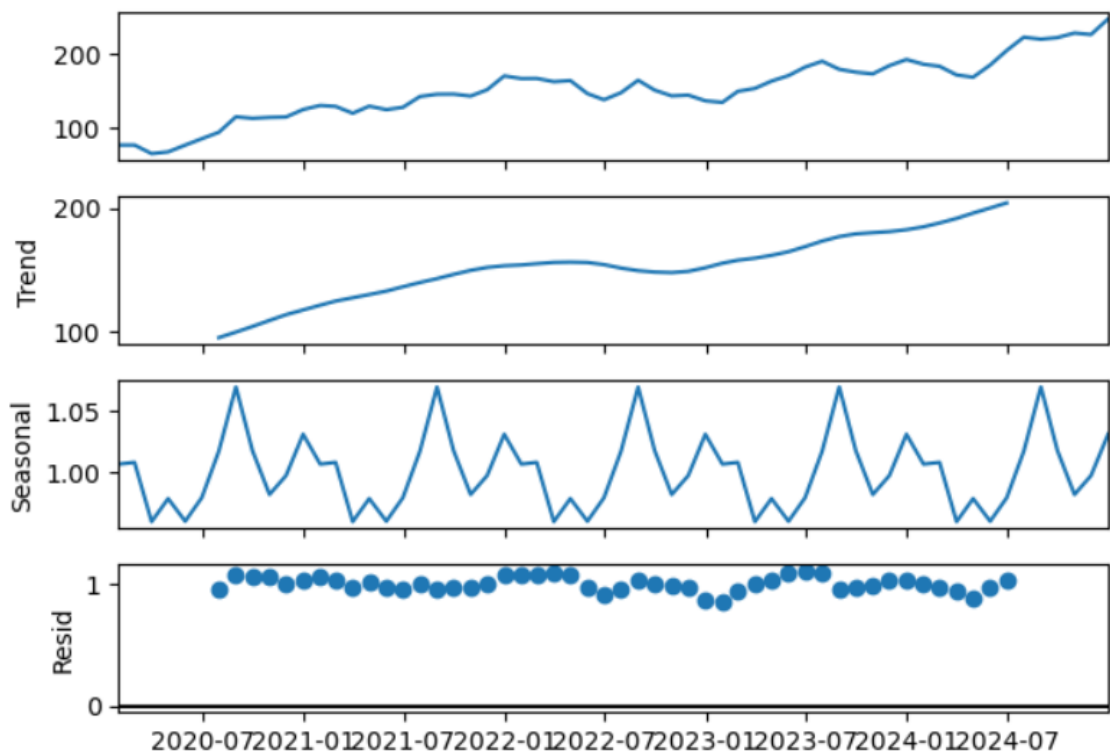
plt.figure(figsize=(12, 10))
plt.subplot(411)
plt.plot(ts, label="Original", color='blue')
plt.title("Original Time Series")
plt.legend()
plt.subplot(412)
plt.plot(result.trend, label="Trend", color='orange')
plt.title("Trend Component")
plt.legend()
plt.subplot(413)
plt.plot(result.seasonal, label="Seasonality", color='green')
plt.title("Seasonal Component")
plt.legend()
```

```
plt.subplot(414)
plt.plot(result.resid, label="Residuals", color='red')
plt.title("Residual Component")
plt.legend()
plt.tight_layout()
plt.suptitle("Time Series Decomposition of Gold Price", fontsize=16, y=1.02)
plt.show()
```

OUTPUT:

<Figure size 1400x1000 with 0 Axes>

AAPL Stock Price Decomposition (Multiplicative Model)



RESULT:

Thus, the program for Implement program for decomposing time series data into trend and seasonality is executed successfully.