| **EXP:7**  **10/04/2025** | **Implement program for decomposing time series data into trend and seasonality** |
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**AIM:**

To analyze the car sales time series data using additive and multiplicative decomposition methods, in order to identify and visualize the underlying trend, seasonality, and residual components.

**PROCEDURE:**

**1) Import Necessary Libraries**

import pandas as pd

import matplotlib.pyplot as plt

from statsmodels.tsa.seasonal import seasonal\_decompose

**2)** **Load and Inspect the Dataset**

**df = pd.read\_csv("/content/sample\_data/Car\_sales.csv")**

**3) Convert Date Column and Set Index**

df['Latest\_Launch'] = pd.to\_datetime(df['Latest\_Launch'], errors='coerce', infer\_datetime\_format=True)

df = df.dropna(subset=['Latest\_Launch'])

**4)Perform Additive Decomposition (6-Month Period)**

sales\_ts = df.groupby('Latest\_Launch')['Sales\_in\_thousands'].sum().sort\_index()

**5)Resample to monthly data**

sales\_ts = sales\_ts.resample('M').sum().fillna(0)

**6) Decompose with a seasonal period**

decomposition = seasonal\_decompose(sales\_ts, model='additive', period=6)

### **7) Shift series to make all values positive**

shifted\_ts = sales\_ts + 1)

**8)Multiplicative decomposition**

multiplicative\_decomp = seasonal\_decompose(shifted\_ts, model='multiplicative', period=6)

fig2 = multiplicative\_decomp.plot()

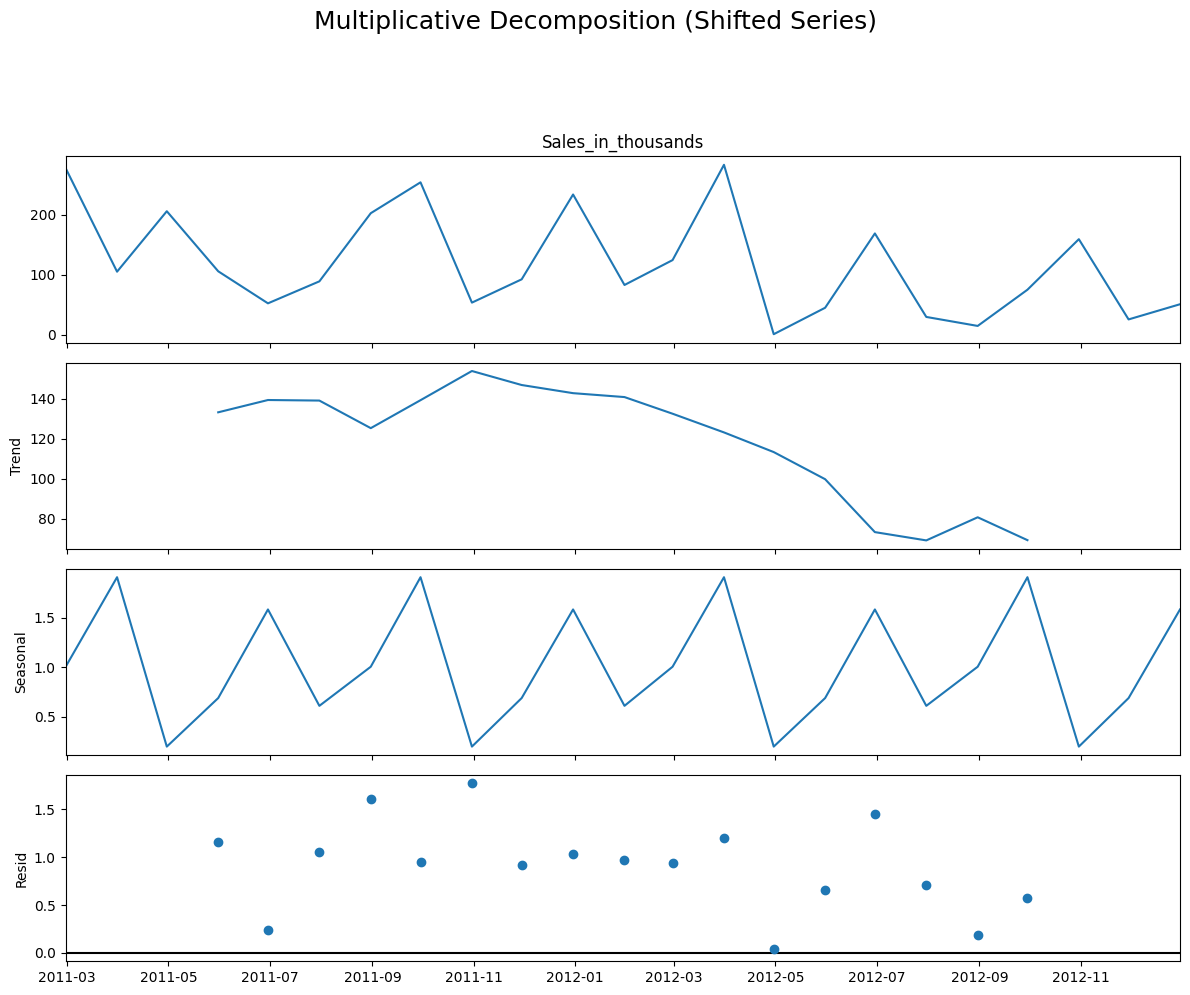
fig2.set\_size\_inches(12, 10)

plt.suptitle("Multiplicative Decomposition (Shifted Series)", fontsize=18, y=1.02)

plt.tight\_layout(rect=[0, 0.03, 1, 0.95])

plt.show()

**OUTPUT:**

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**RESULT:**

Thus the program has been executed successfully