**EX:No.7 DECOMPOSING TIME SERIES FOR TRENDS AND SEASONALITY**

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**AIM :** To decompose time series for trends and seasonality.

**PROCEDURE:**

 Read the dataset and convert the date column to datetime format.

 Set the date column as the index for time series analysis.

 Aggregate the data to a uniform time frequency (e.g., monthly mean).

 Apply seasonal decomposition using seasonal\_decompose.

 Plot the decomposition result.

 Interpret the components to understand the structure of the time series.

**IMPLEMENTATION :**

**Import necessary libraries**

import pandas as pd

import matplotlib.pyplot as plt

from statsmodels.tsa.seasonal import seasonal\_decompose

**Load the dataset**

df = pd.read\_csv('/mnt/data/Electric\_Production.csv')

df.columns = ['Date', 'Production']

df['Date'] = pd.to\_datetime(df['Date'])

df.set\_index('Date', inplace=True)

**Resample monthly (optional, in case data is weekly or daily)**

If data is already monthly, skip this step

df = df.resample('M').mean()

**Apply seasonal decomposition**

result = seasonal\_decompose(df['Production'], model='additive', period=12) # monthly data => period=12

**Plot the decomposition**

plt.figure(figsize=(14, 10))

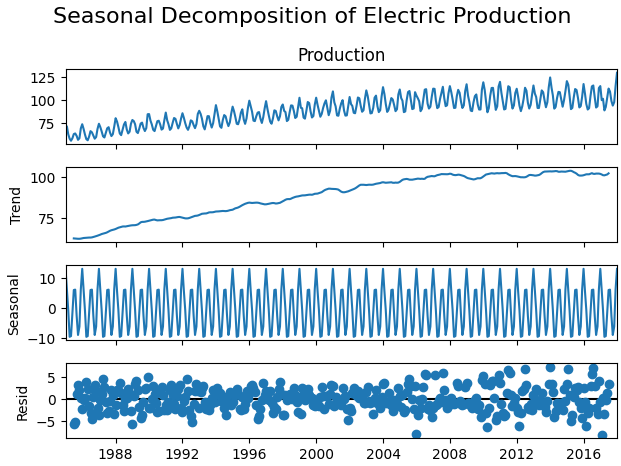
result.plot()

plt.suptitle('Seasonal Decomposition of Electric Production', fontsize=16)

plt.tight\_layout()

plt.show()

**OUTPUT:**

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**RESULT :** Thus decomposition for trends and seasonality has been executed successfully.