7. IMPLEMENT PROGRAM FOR DECOMPOSING TIME SERIES DATA INTO TREND AND SEASONALITY

AIM:

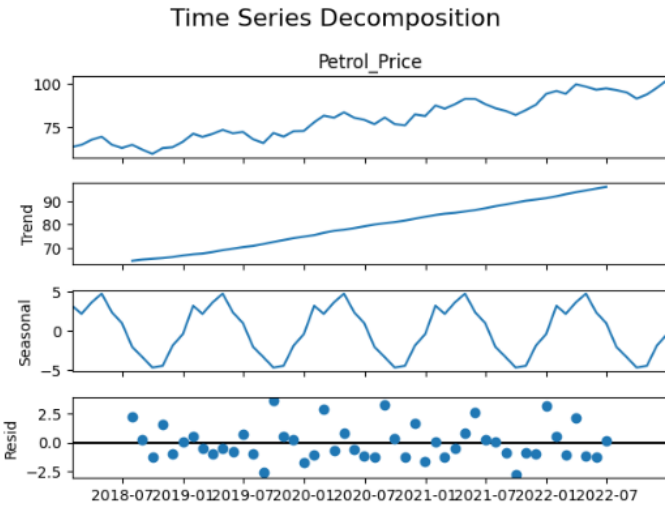
To Implement Program For Decomposing Time Series Data Into Trend And Seasonality.

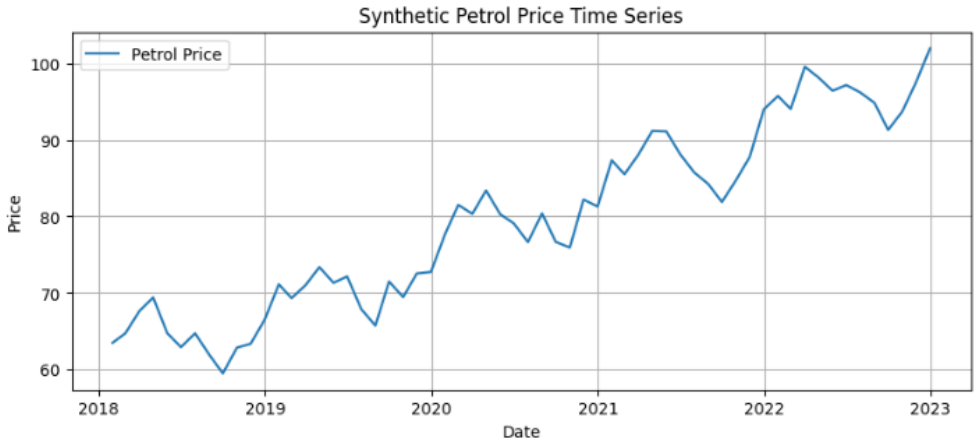
PROCEDURE:

```
# Step 1: Create synthetic monthly petrol price data (e.g., 5 years of monthly data)
np.random.seed(42)
months = pd.date_range(start='2018-01-01', periods=60, freq='M')
trend = np.linspace(60, 100, 60)  # Simulated increasing trend
seasonal = 5 * np.sin(2 * np.pi * months.month / 12)
noise = np.random.normal(0, 2, 60)
prices = trend + seasonal + noise

df = pd.DataFrame({'Date': months, 'Petrol_Price': prices})
df.set_index('Date', inplace=True)

# Step 2: Plot original data
plt.figure(figsize=(10, 4))
plt.plot(df, label='Petrol Price')
plt.title("Synthetic Petrol Price Time Series")
plt.xlabel("Date")
plt.ylabel("Price")
plt.legend()
plt.grid(True)
```

```
plt.show()

# Step 3: Decompose time series
result = seasonal_decompose(df['Petrol_Price'], model='additive', period=12)

# Step 4: Plot decomposed components
result.plot()
plt.suptitle("Time Series Decomposition", fontsize=16)
plt.tight_layout()
plt.show()
```

OUTPUT:





RESULT:

The program to execute decomposing time series data into trend and seasonality Has been executed successfully