synthetic data creation

In [10]:
```
import pandas as pd
import numpy as np

# Create synthetic monthly sales data
np.random.seed(42)
date_rng = pd.date_range(start='2018-01-01', end='2022-12-01', freq='MS')
sales = 200 + np.sin(np.arange(len(date_rng)) * (2 * np.pi / 12)) * 20 + np.random.no

# Save to CSV
df = pd.DataFrame({'Date': date_rng, 'Sales': sales})
df.to_csv("synthetic_sales.csv", index=False)
print("CSV created: synthetic_sales.csv")
```

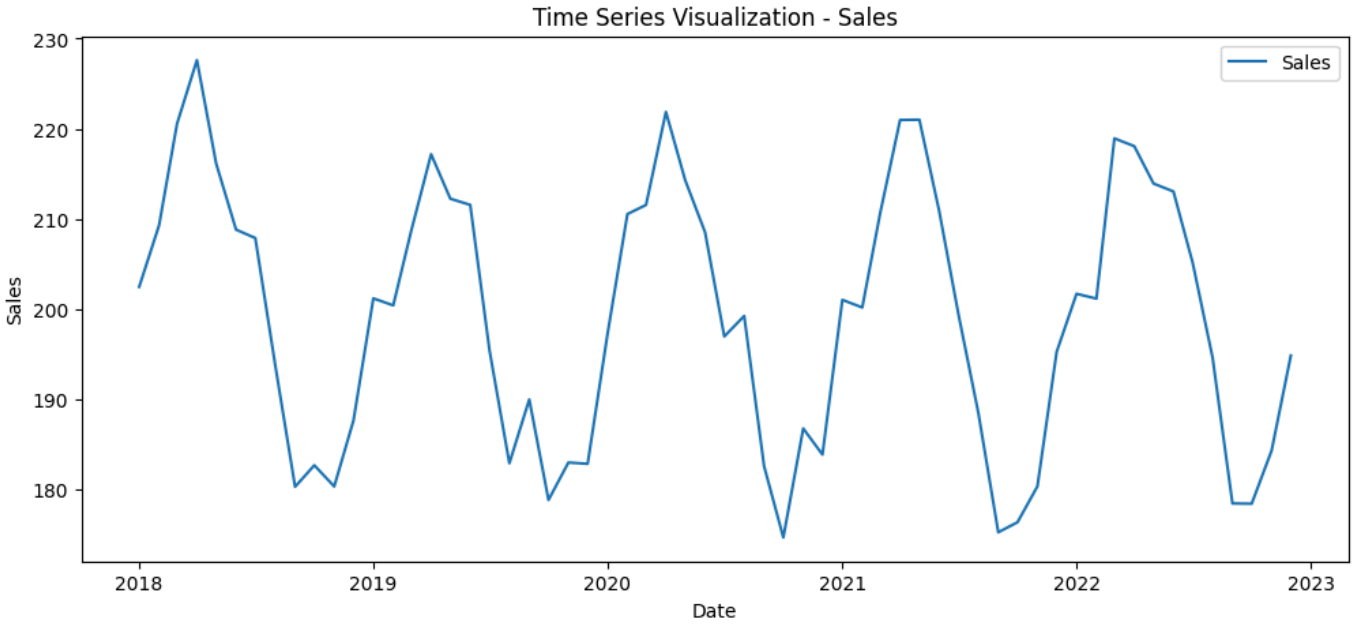
```
CSV created: synthetic_sales.csv
```

visualisation of time sereies data

In [11]:
```
import pandas as pd
import matplotlib.pyplot as plt

# Load dataset
df = pd.read_csv("synthetic_sales.csv", parse_dates=['Date'])
df.set_index('Date', inplace=True)

# Plot time series
plt.figure(figsize=(12,5))
plt.plot(df['Sales'], label="Sales")
plt.title("Time Series Visualization - Sales")
plt.xlabel("Date")
plt.ylabel("Sales")
plt.legend()
plt.show()
```



Trend , seasonal and resid

In [ ]:
```
from statsmodels.tsa.seasonal import seasonal_decompose

# Decompose time series
decomposition = seasonal_decompose(df['Sales'], model='additive', period=12)
decomposition.plot()
plt.show()
```


Sales
220
200
180
Trend
200
198
Seasonal
20
0
−20
Resid
5
0
−5
2018-01
2018-07
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07