**Exp:8**

**17.04.2025**

**Create an ARIMA model for time series forecasting**

**Aim:**

To develop a python program for creating an ARIMA model for time series forecasting

**1. Importing Required Libraries**

pip install statsmodels matplotlib scikit-learn

**Explanation:**

We import numpy (np) is used for numerical operations, pandas (pd) for data manipulation, matplotlib.pyplot (plt) for plotting.

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**2. Loading the Dataset**

file\_path = "/mnt/data/gold.csv"

df = pd.read\_csv(file\_path)

**Explanation:**

We use pd.read\_csv() to load a CSV file containing Gold data.

**3. Display the first few rows to understand the structure**

print(data.head())

print(data.info())

**4.** **Preprocessing the data**

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

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

time\_series = data['USD (AM)'].fillna(method='ffill')

plt.figure(figsize=(12, 6))

plt.plot(time\_series, label='USD (AM) Price')

plt.title('Gold Price (USD AM) Over Time')

plt.xlabel('Date')

plt.ylabel('Price (USD)')

plt.legend()

plt.grid()

plt.show()

### 5. Split the Data

### train\_size = int(len(time\_series) \* 0.8)

### train, test = time\_series[:train\_size], time\_series[train\_size:]

**6.Model fitting**

from statsmodels.tsa.arima.model import ARIMA

model = ARIMA(train, order=(5, 1, 0)) # Replace (5, 1, 0) with optimal (p, d, q)

model\_fit = model.fit()

print(model\_fit.summary())

**7.** **Forecasting**

from sklearn.metrics import mean\_squared\_error

forecast = model\_fit.forecast(steps=len(test))

mse = mean\_squared\_error(test, forecast)

print(f"Mean Squared Error (MSE): {mse}")

plt.figure(figsize=(12, 6))

plt.plot(test.index, test, label='Actual')

plt.plot(test.index, forecast, label='Forecast', color='red')

plt.title('ARIMA Forecast vs Actual')

plt.xlabel('Date')

plt.ylabel('Price (USD)')

plt.legend()

plt.grid()

plt.show()

**Outputs:**

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**Result:**

Thus the Program for creating an ARIMA model for forecasting has been implemented successfully.