EXERCISE NO.: 08
ARIMA MODEL FOR TIME SERIES FORECASTING

AIM:
To implement a Python program to create an ARIMA model for time series forecasting.

PROCEDURE:

1. **Import the necessary libraries.**
   ```
   import pandas as pd
   from statsmodels.tsa.arima.model import ARIMA
   import matplotlib.pyplot as plt
   ```

2. **Load the dataset.**
   ```
   df = pd.read_csv("C:/Users/Lenovo/Downloads/amazon.csv", encoding='latin1')
   ```

3. **Preprocess the data.**
   ```
   month_map = {
     'Janeiro': 'January', 'Fevereiro': 'February', 'Março': 'March',
     'Abril': 'April', 'Maio': 'May', 'Junho': 'June',
     'Julho': 'July', 'Agosto': 'August', 'Setembro': 'September',
     'Outubro': 'October', 'Novembro': 'November', 'Dezembro': 'December'
   }

   df['month'] = df['month'].map(month_map)
   df['date'] = pd.to_datetime(df['month'] + ' ' + df['year'].astype(str), format='%B %Y')
   df.set_index('date', inplace=True)
   ```

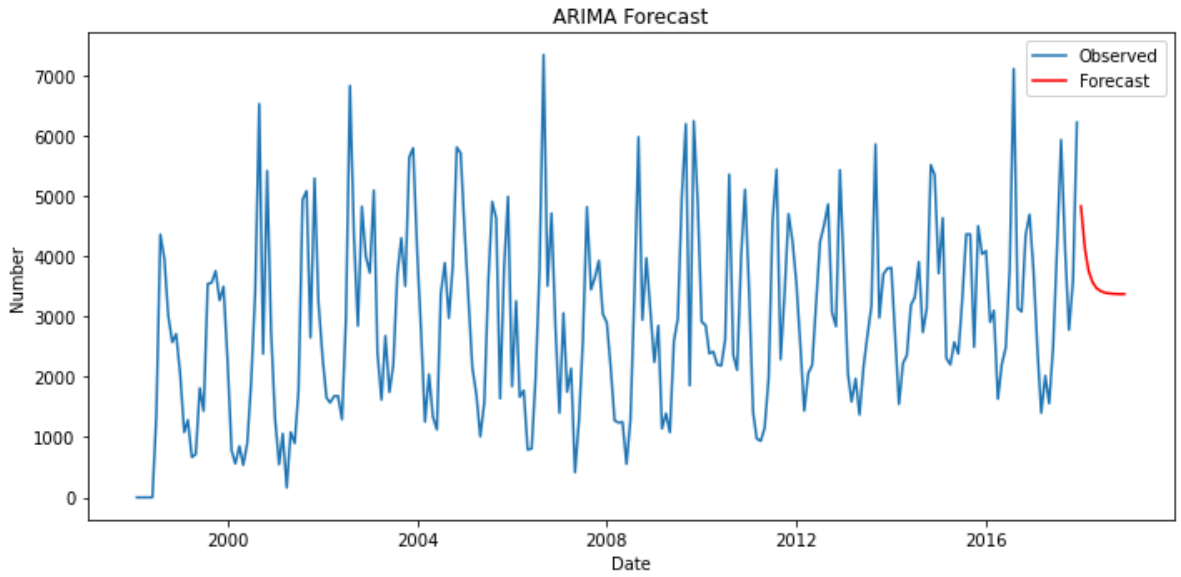
4. **Aggregate the preprocessed data.**
   ```
   df_monthly = df.resample('M')['number'].sum()
   ```

5. **Create the ARIMA model.**
   ```
   model = ARIMA(df_monthly, order=(1, 1, 1))
   model_fit = model.fit()
   ```

6. **Visualise the ARIMA model forecasting.**
   ```
   forecast = model_fit.forecast(steps=12)
   plt.figure(figsize=(10, 5))
   plt.plot(df_monthly, label='Observed')
   plt.plot(forecast, label='Forecast', color='red')
   plt.title('ARIMA Forecast')
   plt.xlabel('Date')
   plt.ylabel('Number')
   ```

```
plt.legend()
plt.tight_layout()
plt.show()
```

OUTPUT:



RESULT:

Thus the implementation for ARIMA model forecasting has been successfully implemented and verified.