EXPERIMENT 8

AIM:

To build an ARIMA model for forecasting **rainfall** based on time series data uploaded via a CSV file.

PROCEDURE:

1.Upload Dataset using a file uploader (CSV format).

2.Convert Data to Time Series assuming daily observations.

3.Visualize Rainfall Trend using a line chart.

4.Build ARIMA Model with parameters (p=5, d=1, q=0).

5.Forecast Next 30 Days of rainfall.

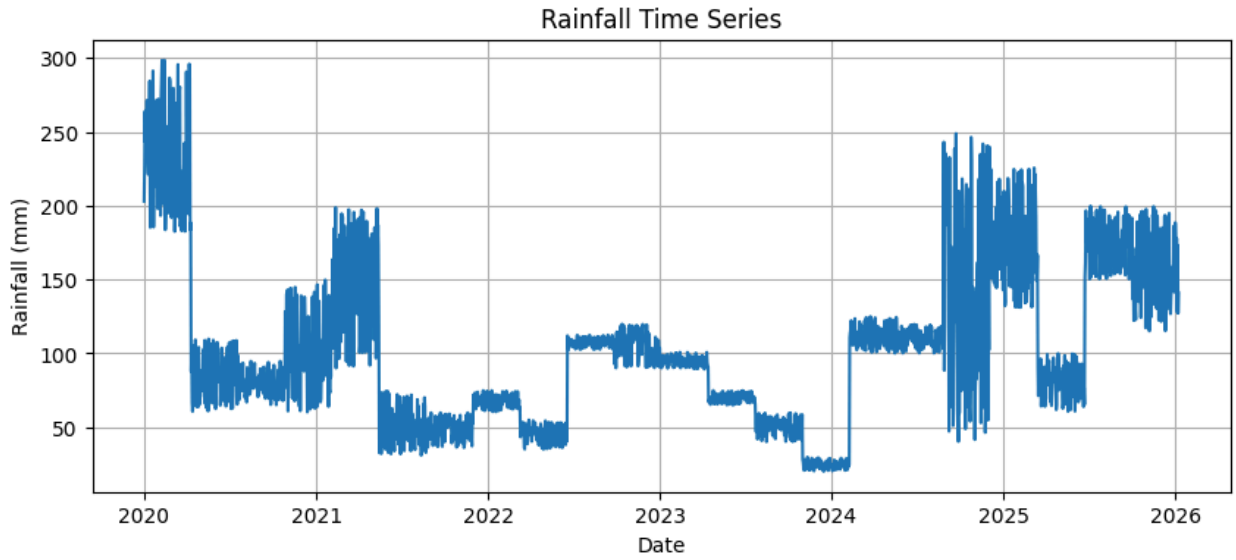
6.Display Forecast using a line chart for comparison.

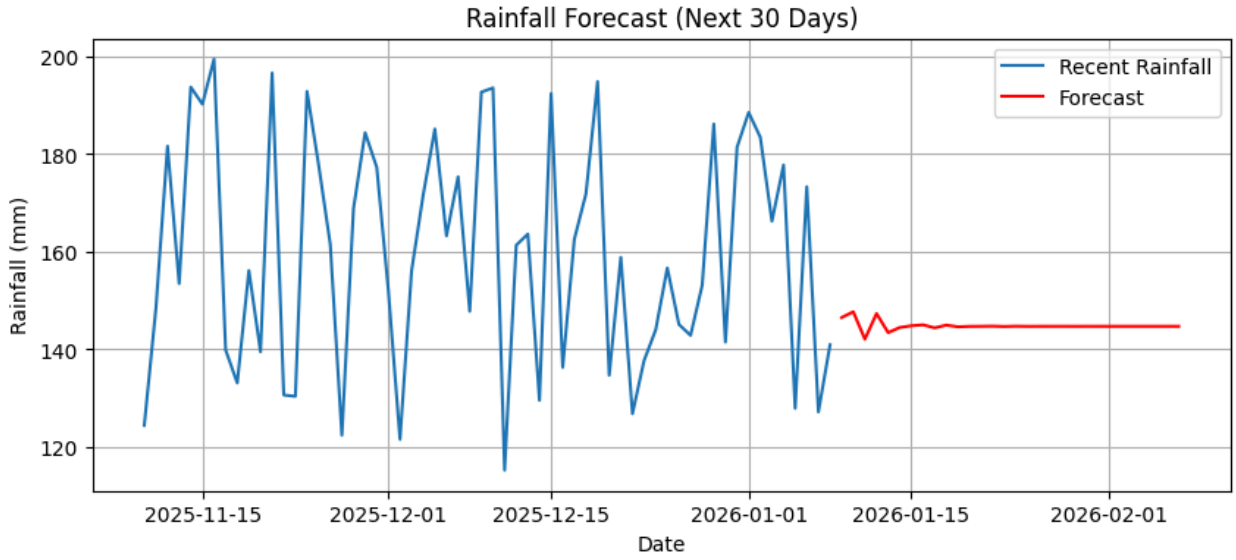
CODE:

```
import pandas as pd
import matplotlib.pyplot as plt
from statsmodels.tsa.arima.model import ARIMA
import ipywidgets as widgets
from IPython.display import display

# File upload widget
uploader = widgets.FileUpload(accept='.csv', multiple=False)
display(uploader)

def handle_upload(change):
    if uploader.value:
        # Load dataset
        uploaded_file = next(iter(uploader.value.values()))
        df = pd.read_csv(pd.io.common.BytesIO(uploaded_file['content']))

        # Assume daily data
        df.index = pd.date_range(start='2020-01-01', periods=len(df), freq='D')

        # Use rainfall column
        rainfall_series = df['rainfall']
```

```
    # Plot time series
    plt.figure(figsize=(10, 4))
    plt.plot(rainfall_series)
    plt.title('Rainfall Time Series')
    plt.xlabel('Date')
    plt.ylabel('Rainfall (mm)')
    plt.grid(True)
    plt.show()

    # ARIMA model
    model = ARIMA(rainfall_series, order=(5, 1, 0))
    model_fit = model.fit()

    # Forecast next 30 days
    forecast = model_fit.forecast(steps=30)
    forecast_index = pd.date_range(start=rainfall_series.index[-1] + pd.Timedelta(days=1),
periods=30)

    # Plot forecast
    plt.figure(figsize=(10, 4))
    plt.plot(rainfall_series[-60:], label='Recent Rainfall')
    plt.plot(forecast_index, forecast, color='red', label='Forecast')
    plt.title('Rainfall Forecast (Next 30 Days)')
    plt.xlabel('Date')
    plt.ylabel('Rainfall (mm)')
    plt.legend()
    plt.grid(True)
    plt.show()

uploader.observe(handle_upload, names='value')
```

OUTPUT:





RESULT:

The ARIMA model successfully predicted rainfall for the next 30 days. The plotted forecast showed a smooth continuation of recent rainfall trends, helping anticipate future weather conditions based on historical data.