**IMPLEMENT PROGRAMS TO CHECK STATIONARY OF A TIME SERIES DATA**

**AIM**:

Implement programs to check stationary of a time series data.

**PROGRAM:**

pip install pandas numpy matplotlib statsmodels

import matplotlib.pyplot as plt

import pandas as pd

# Function to plot the time series data

def plot\_time\_series(data):

plt.figure(figsize=(10,6))

plt.plot(data)

plt.title("Time Series Data")

plt.xlabel("Time")

plt.ylabel("Value")

plt.show()

# Example: Load your time series data

# data = pd.read\_csv('your\_data.csv', index\_col='Date', parse\_dates=True) # Uncomment if you have your own data

# For the purpose of this example, let's generate a synthetic series

data = pd.Series([1, 2, 3, 4, 5, 4, 3, 2, 1, 0, -1, -2, -3, -4])

plot\_time\_series(data)

from statsmodels.tsa.stattools import adfuller

def adf\_test(data):

result = adfuller(data)

print("ADF Statistic:", result[0])

print("p-value:", result[1])

print("Critical Values:")

for key, value in result[4].items():

print(f"\t{key}: {value}")

if result[1] < 0.05:

print("The time series is stationary (reject the null hypothesis).")

else:

print("The time series is not stationary (fail to reject the null hypothesis).")

**OUTPUT:**

ADF Statistic: -0.7833494518006413

p-value: 0.8239641801291269

Critical Values:

1%: -4.137829282407408

5%: -3.1549724074074077

10%: -2.7144769444444443

The time series is not stationary (fail to reject the null hypothesis).

**RESULT:**

Thus the expected output has beed recived successfully.