**Exp:4**

**20.02.2025**

**Augmented Dickey -Fuller(ADF) Test**

**Stationary Check**

**Aim:**

To develop a python program for stationary check to the given time series data.

**1. Importing Required Libraries**

import pandas as pd

import matplotlib.pyplot as plt

from statsmodels.tsa.stattools import adfuller

**Explanation:**

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

Adfuller for stationary check

**2. Loading the Dataset**

df=pd.read\_csv('/content/gold.csv',parse\_dates=['Date'],index\_col=['Date'])

**Explanation:**

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

**3. Describing the dataset**

dataset.describe()

1. **Extracting the output column**

series = df['USD (AM)'].dropna()

**5.Plotting the Dataset**

plt.figure(figsize=(10, 5))

plt.plot(series, label="USD (AM) Price")

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

plt.xlabel("Date")

plt.ylabel("Price")

plt.legend()

plt.show()

**6.Stationary Check**

def check\_stationarity(series):

result = adfuller(series)

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

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

print("Critical Values:", result[4])

if result[1] < 0.05:

print("❌ Reject the null hypothesis: The series is stationary.")

else:

print("✅ Fail to reject the null hypothesis: The series is non-stationary.")

**7.Before Stationary**

print("Before Differencing:")

check\_stationarity(series)

**Before Differencing:**

**ADF Statistic: -1.0653629752531542**

**p-value: 0.7286853153924067**

**Critical Values: {'1%': -3.4317462624364112, '5%': -2.862156987914191, '10%': -2.567098424977626}**

**✅ Fail to reject the null hypothesis: The series is non-stationary.**

**8.After Stationary**

df['USD (AM) Diff'] = df['USD (AM)'].diff().dropna()

print("\nAfter Differencing:")

check\_stationarity(df['USD (AM) Diff'].dropna())

After Differencing:

ADF Statistic: -13.576424711442268

p-value: 2.1651705729972953e-25

Critical Values: {'1%': -3.4317462624364112, '5%': -2.862156987914191, '10%': -2.567098424977626}

❌ Reject the null hypothesis: The series is stationary.

**Result:**

Thus the Program for Stationary check using augmented dickey fuller test has been performed successfully.