**EX:No.3 LINEAR REGRESSION 221501010 21/01/25**

**AIM :** To implement linear regression on a time series data .

**IMPLEMENTATION :**

import pandas as pd

from sklearn.model\_selection import train\_test\_split

from sklearn.linear\_model import LinearRegression

import matplotlib.pyplot as plt

import pandas as pd

import matplotlib.pyplot as plt

from sklearn.model\_selection import train\_test\_split

from sklearn.linear\_model import LinearRegression

**#Load the dataset**

file\_path = "ch3\_airline\_passengers.csv"

df = pd.read\_csv("/content/ch3\_airline\_passengers.csv")

**#Convert 'Month' to a numerical format**

df["Month"] = pd.to\_datetime(df["Month"])

df["Month\_Ordinal"] = df["Month"].map(pd.Timestamp.toordinal)

#Define features (X) and target variable (y)

X = df[["Month\_Ordinal"]]

y = df["AirPassengers"]

#Split data into training and testing sets

X\_train, X\_test, y\_train, y\_test = train\_test\_split(X, y, test\_size=0.2, random\_state=42)

#Train the linear regression model

model = LinearRegression()

model.fit(X\_train, y\_train)

#Model coefficients

slope = model.coef\_[0]

intercept = model.intercept\_

print(f"Slope: {slope}")

print(f"Intercept: {intercept}")

#Make predictions

y\_pred = model.predict(X\_test)

#Plot the regression line

plt.scatter(X\_test, y\_test, color='blue', label='Actual Data')

plt.plot(X\_test, y\_pred, color='red', linewidth=2, label="Regression Line")

plt.xlabel("Date (Ordinal)")

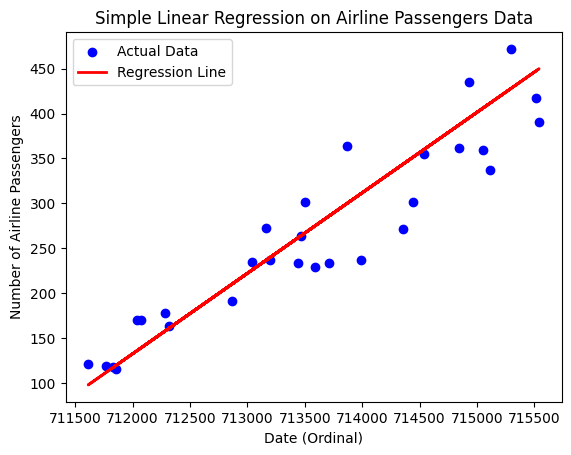
plt.ylabel("Number of Airline Passengers")

plt.title("Simple Linear Regression on Airline Passengers Data")

plt.legend()

plt.show()

**OUTPUT:**



**RESULT :** Thus linear regression has been implemented on a time series data.