School of Computer Science Engineering and Technology

Course- B. Tech
Course Code- CSET369
Year- 3rd Year
Date- Week 12

Type- Specialization Elective
Course Name- Time Series Analysis
Semester- V

Lab Assignment -11

Experiment	CO1	CO2	CO3
RNN			✓

Objective: Develop and train a **Recurrent Neural Network (RNN)** for **multivariate time series forecasting**, where multiple input variables jointly predict a future target variable, and evaluate model performance.

Download the following time series dataset and read them as a python dataframe and print the heads.

- ✓ **Dataset:** Daily Stock Market Index data (e.g., NIFTY50, S&P500, or any financial time series).

Perform all the following tasks on the above dataset.

Task 1 **— Data Preparation**

1. Load the multivariate dataset and inspect its attributes.
2. Plot each variable to understand trends and correlations.
3. Normalize all features using **MinMaxScaler** (0–1 range).
4. Define the **target variable** (e.g., temperature or energy demand).
5. Convert data into supervised form — e.g., use past 7 timesteps of all features to predict the next value of the target variable.

Task 2 **— Build and Train Multivariate RNN**

1. Split the data into **training (80%)** and **testing (20%)** sets.
2. Reshape input data into 3D format: [samples, time_steps, features].
3. Build an RNN model

Task 3 **— Forecasting and Evaluation**

1. Predict target values for the test dataset using the trained RNN.
2. Plot **actual vs. predicted** values for the target variable.
3. Calculate error metrics: **RMSE**, **MAE**, and **R^2 score**.
4. Evaluate how the inclusion of multiple features affects forecasting accuracy compared to a univariate model.