Course Code: CSE433 **Course Name: Time Series & Sequential Data Analytics**

1. Given the dataset, **Air passengers** dataset, perform the following task.
    i. Load the dataset
    ii. Investigate the structure of the dataset and perform exploratory data analysis
    iii. Perform the group by operations by month and year
    iv. Do extensive plots to analyze the datasets such as histogram plot, density plot and pair plot and heat map
    v. Perform feature engineering using sliding window and expanding window features
    vi. Check the stationarity, trend and seasonality of the dataset.

2. Given the dataset, **female birth** dataset, perform the following task.
    i. Load the dataset
    ii. Investigate the structure of the dataset and perform exploratory data analysis
    iii. Perform the group by operations by month and year
    iv. Do extensive plots to analyze the datasets such as histogram plot, density plot and pair plot, whisker plot
    v. Perform feature engineering using sliding window and expanding window features
    vi. Perform data interpolation and down sampling

3. Given the dataset, **bill charge** dataset, perform the following task.
    i. Load the dataset
    ii. Perform sliding and expanding window features by analyzing it
    iii. Perform the group by operations by month and year
    iv. Do extensive plots to analyze the datasets such as histogram plot, density plot and pair plot, autocorrelation plot
    v. Check the stationarity, trend and seasonality of the dataset.
    vi. Perform the data Upsampling and down sampling and plot it.

4. Given the dataset, **Daily minimum temperature dataset**, perform the following task.
    i. Load the dataset
    ii. Investigate the structure of the dataset and perform exploratory data analysis
    iii. Perform date and lag-based features
    iv. Do extensive plots to analyze the datasets such as histogram plot, density plot and pair plot and autocorrelation plot
    v. Perform feature engineering using sliding window and expanding window features
    vi. Perform the stationarity test using (ADF & KPSS test)

5. Given the dataset, **shampoo dataset**, perform the following task.
    i. Load the dataset
    ii. Investigate the structure of the dataset and perform exploratory data analysis
    iii. Explore the temporal relationships with line, scatter and autocorrelation plots.
    iv. Do more extensive plots to analyze the datasets such as histogram plot, density plot and heatmap plot
    v. Perform Upsampling using different interpolations and visualize it.
    vi. Perform the stationarity test using (ADF & KPSS test)