Final Problem Statement/Assignment

Algorithmic Trading Winter Project
Finance And Analytics Club, IIT Kanpur

Deadline: 2 January 2025

Disclaimer: The following assignment aims to implement a trading strategy. Do the questions sequentially, and you will have your first automated trading strategy with you to trade with. We again advise you to refrain from any use of plagiarism, as it affects your ratification. For submission, you are required to submit separate .ipynb files for each question (Remember to run all cells before submission).

Some qustions will need a dataset to work with. You need to use the time series of TCS in the year 2023, on a 1 day timeframe. Also, note that all your technical indicators should be a function that take the dataset as an input, and return the same dataset after modifications.

Question 1. The first question is on technical indicators. You are required to code **ALL** the indicators in the given table. Remember to make functions.

Bollinger Bands(Sample)	MACD	Stochastic Oscillator(SO)
Relative Strength Index	Average Directional Index	Average True Range(ATR)

Question 2. This question is for signal generation. You need to create a signal generating function for each indicator that you have coded in the previous question. Use these functions on the specified dataset and print the number of buy / sell signals you get from the function.

Question 3. Now for the finale: You need to code your own backtesting agent/engine. The engine will take the dataset as an input. Note that you will take your initial capital as 1,000 INR and will use all your capital in a long trade.

Derivables: Your backtesting agent shall perform the operations of long trades, stop loss and take profit. Clearly mention the percentage of stop loss/take profit that you fix in your backtesting engine as a comment.Your backtestng framework should print the net profit, sharpe ratio, maximum drawdown, overall total trades, total number of winning/losing trades (Do check that the number of winning and losing trades combined should be the total number of trades).

Hints: You will need a lot of memory(multiple arrays) for the backtesting engine. Few of them will be your everyday portfolio value, return of each trade, boolean variable to keep track of an ongoing trade.

Question 4. (Optional) This will be difficult to understand and code. You need to upgrade your engine in the previous question such that it incorporates short trades. Also you need to code trailing stop loss/take profit in the backtesting system. These concepts were brushed up in the last meet. If you need more material for these concepts, do put a message in the whatsapp group.

The third question is lengthy and requires a long dedicated time to code. Just for reference, it took me(the problem setter) a total of 2 days to code my first backtesting engine. Hence the assignment has been given a huge time period to complete. Enjoy the assignment!!