Perfect 👍 You're planning it the right way, Rayhan. Since you'll give me the dataset later (1990–2022 stock data), I'll first give you a **structured flowchart/roadmap** that shows **how all the equations fit together into an ML + AI pipeline for Deepstock**.

📌 Deepstock ML & AI Roadmap

1. Data Collection

- Historical stock data (1990–2022)
- Features: Open, High, Low, Close, Volume, Sentiment/Fundamental data

2. Data Preprocessing

- **Normalization:**

$$a_m^{scaled} = \frac{a_m^i - a_{min}}{a_{max} - a_{min}}$$

- **Anti-normalization (for output):**

$$\hat{y}_t = y_t^0 \cdot (y_{max} + y_{min}) + y_{min}$$

- **Feature Selection (Correlation):**

$$Corr(i) = \frac{cov(a_i, b)}{\sqrt{var(a_i) \cdot var(b)}}$$

3. Feature Engineering (Stock Technical Indicators)

- **SMA:**

$$SMA(t,N) = \frac{1}{N} \sum_{k=1}^{N} CP(t-k)$$

- **EMA:**

$$EMA(t,\Delta) = (CP(t) - EMA(t-1)) \cdot \Gamma + EMA(t-1)$$

- **MACD:**

$$MACD=EMA(t,k)-EMA(t,d)$$

- **OBV:**

$$OBV=OBVpr\pm volume$$

- **RSI:**

$$RSI=100\cdot\frac{1}{1+RS(t)}$$

4. Model Building (ML + AI)

Deep Learning Models

- **Neural Network / Perceptron:**

$$Z=WTX+b$$

- **Activation Functions:** Sigmoid, ReLU, tanh
- **RNN:**

$$Mt=tanh(W[STMt-1,Et]+b)$$

- **Autoencoder (Feature Compression):**

$$E(X,X')=\|X-X'\|2$$

- **RBM (Pre-training):**

$$G(X,Y)=-\alpha TX-\beta TY-XTWY$$

AI Algorithms

- **Backpropagation Update:**

$$W(n)=W(n-1)-\Delta W(n)$$

- **Extreme Learning Machine (ELM):**

$$Yj=\sum i=1d\eta if(WiXj+ei)$$

- **Radial Basis Function Network (RBF):**

$$y(x)=\sum i=1N\mu iv(\|x-xi\|)y(x) = \sum_{i=1}^N \mu_i \nu(\|x - x_i\|)$$

5. Training

- Input: Technical Indicators + Normalized Data
- Output: Predicted Stock Price / Trend
- Optimization: Backpropagation, Gradient Descent

6. Evaluation

- **MSE:**

$$MSE=1n\sum k=1n(yk-y^k)2MSE = \frac{1}{n} \sum_{k=1}^n (y_k - \hat{y}_k)^2$$

- **RMSE:**

$$RMSE=1N\sum t=1N(y^t-yt)2RMSE = \sqrt{\frac{1}{N} \sum_{t=1}^N (\hat{y}_t - y_t)^2}$$

- **MAPE:**

$$MAPE=1N\sum t=1N|yt-y^t|ytMAPE = \frac{1}{N} \sum_{t=1}^N \frac{|y_t - \hat{y}_t|}{y_t}$$

- **Directional Accuracy (DA):**

$$DA=1N\sum t=1NDtDA = \frac{1}{N} \sum_{t=1}^N D_t$$

🚀 Flowchart (Step-by-Step)

Data Collection → Preprocessing (Normalization, Feature Selection) → Feature Engineering (SMA, EMA, MACD, OBV, RSI) → Model Building (NN, RNN, CNN, AE, RBM, ELM, RBF) → Training (Backprop, Optimization) → Evaluation (MSE, RMSE, MAPE, DA) → Prediction Output

👉 When you give me the dataset, I'll help you **write the ML + AI code in Python (TensorFlow/PyTorch + Scikit-learn)** and integrate these equations step by step.

Do you want me to **draw this roadmap as a visual flowchart (diagram style)** so you can use it in your project report/presentation?