#### Weighted least square optimization technique algorithm.

1. Load line and bus data of the transmission network, which consists of the measured voltage data, current, phase angles, transformer tap position, reactive and real power limits, reactance, resistance data and susceptance values.
2. Create mathematical model of the system by calculating for the Admittance matrix based on mathematical model of the system in terms of the phase and voltage magnitude. Equations (3.34) and (3.35)
3. Perform Load flow analysis, using the Newton Raphson method. Results obtained includes real power on each bus and line, reactive power in each bus and line. Real and reactive power flow results. Based on equation (3.16)
4. Initialization of voltage magnitudes and phase angle according to bus number and line.

𝜃𝑖, 𝑣𝑖 𝑖 = 1,2 … … … 𝑛 Map the state variables 𝜃𝑖, 𝑣𝑖 to the state space equivalent. Based on equations (3.60 and 3.61)

1. Derive the H Jacobian matrix with respect to state variables. Equation (3.39)
2. Perform Observability analysis to determine if there exist a solution to the state vector (3.63).

If Observability fails return to 2.

1. Establish the error covariance matrix R and error detection matrix in equation (3.76 and 3.85)
2. Application of the weighted least optimization technique (2.33 and 3.64)
3. Using the iteration formula in equation (3.22 and 3.64) we get the (k+1)-th estimation result.
4. Apply error indices to quantify error.

