Step by step Guide in Applying Nodal and Mesh Analysis

Nodal Analysis:

Given a circuit, follow these steps:

1) Identify the N nodes. One of these will be the ground node (which is usually at the bottom of the circuit. The ground node voltage is 0 V and is used as the reference voltage with which the other voltages will be compared.)

   Label the voltage at each node (except the ground node) by the node voltages $v_a, v_b, \ldots$ (or $v_1, v_2, \ldots$). Henceforth, I will refer to these node voltages as $v_a, v_b, \ldots$.

2) With N nodes, we next write N-1 independent equations. At each node (except for the ground node) apply KCL. In doing this we will end up with N-1 equations with $v_a, v_b, \ldots$ as the variables to be solved for.

3) Solve the set of N-1 simultaneous equations. This gives the values for $v_a, v_b, \ldots$

4) If you need to find current levels in the circuit, use the node voltages ($v_a, v_b, \ldots$) to write the appropriate equations.

Mesh Analysis:

Given a circuit, follow these steps:

1) Identify the meshes (i.e. loops that do not contain other loops) in the circuit. Label the mesh currents by currents $i_a, i_b, \ldots$ (or $i_1, i_2, \ldots$). Henceforth, I will refer to these mesh currents as $i_a, i_b, \ldots$.

   Draw the currents in the circuit (usually in a clockwise direction).

2) Assuming N loops (meshes) have been identified. For each loop apply KVL around the loop. This results in N independent equations.

3) Solve the N simultaneous equations. This results in finding the values for $i_a, i_b, \ldots$.

4) If you need to find voltage levels in the circuit, use the mesh currents ($i_a, i_b, \ldots$) to write the appropriate equations.