

## 1b. Guide for Excel solver

### Input for Excel Solver

#### Step 1 –

Write down the variables in one column and values in the next column. Let the values be 0 initially. Similarly input the values of  $P_{load}$  which are already given.

#### Step 2 –

Write the objective function which is to minimize the cost. The objective function is the total cost cell in the excel file.

#### Step 3 –

The constraints are already included the excel sheet. The lower bound and upper bound for theta should be kept as -3.14 to 3.14 radians. The lower bound of generation capacity is 0 and there is no upper bound given. The susceptance matrix has all the values needed for power flow calculations. The power flow limit in line 1-2 is also included with respective reactance.

### Running Excel solver

Select Data (from top bar) => Solver. (Top right corner)

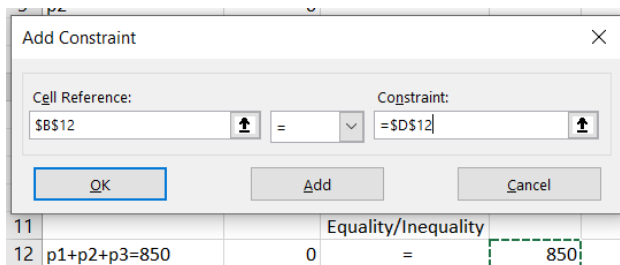
**Step 1 - Set Objective** – Select the cell where objective function has been written down.

**Step 2 - To:** Min

**Step 3 - By changing variable cells:** Select the whole column containing values of the variables  $p_1$ ,  $p_2$ ,  $p_3$ ,  $\vartheta_1$ ,  $\vartheta_2$  and  $\vartheta_3$

**Step 4 - Subject to constraints:** select 'Add'

For Cell reference select the constraint equation cell, select appropriate equality/inequality sign, for Constraint select the cell with constraint value.



**Step 5 - Do not select the option – Make unconstrained variables non-negative**

**Step 6 - Select a solving method** = GRG nonlinear or Simplex LP depending upon the objective function

**Step 7 - Select 'Solve'**