Steps of the Calculation:

I. Calculation of Alpha
1. Obtain data from the available resources.
2. Calculate the pressure drop across the top and bottom of the column, P_top and P_bot.
3. Evaluate the temperatures and calculate P_pure at the given temperature.
4. Calculate the alpha value from the pressure.

II. Using McCabe Method
1. Implement McCabe method in MATLAB code to obtain the ideal and actual stages and the feed tray location.
2. Perform the calculations for different values of R/R_min.

III. Rough Estimation of the Cost to Obtain the R/R_min Optimum
1. Calculate the diameter of the column.
2. Determine the height and thickness of the material required.
3. Estimate the cost of the trays based on the diameter.
4. Add the above values to obtain the total column cost.
5. Estimate the heat load of the reboiler and condenser to calculate their respective costs.
6. Add all the above costs and multiply the sum by a factor of 1.2*2 to adjust for manufacturing and piping costs.
7. Use depreciation to calculate the annual cost for the column.
8. Calculate the annual operating cost and add it to the column cost to obtain the total cost.
9. Repeat the above steps for all values of R/R_min to obtain the R/R_min optimum with the lowest total cost.

IV. Tray Hydraulics and Bubble Cap Design
1. Calculate the number of passes and the area distribution over the tray.
2. Determine the weir height and the height over the weir.
3. Decide on the tray layout.
4. Calculate the downcomer dynamics.
5. Determine the liquid gradient and the drop through aerated liquid.
6. Calculate the vapor distribution and the corrected approach to flooding.
7. Calculate the tray pressure drop and the head loss through the wet slot.