

Assignment “Syst Op”

Note: This is a group project. Communicate freely via e-mail forum. Submissions can be individual or partnered.

- 1) Two areas are connected by a tie line. Area 1 has 1500 MW of generation; area 2 has 3000 MW. Initially, $\Delta p_{tie1} = \Delta p_{tie2} = 0$, each area is operating at 60 Hz, and each area is generating half of its rated output. $\beta_1 = 750$ MW/Hz and $\beta_2 = 1200$ MW/Hz. The load in area 1 suddenly decreases by 300 MW. **Calculate the steady-state frequency error Δf , the steady-state tie line error Δp_{tie1} , and the area control error for area 1.**

- 2) An area contains 3 generators, rated 100 MVA, 200 MVA and 600 MVA. The regulation constants, on the base of each machine, are 0.04, 0.05, and 0.06 per unit respectively. Initially, each machine is delivering one-half its rated power.
 - a) Convert the R's to per unit values on a 100 MVA base.
 - b) The system frequency suddenly increases by 0.18 Hz. What is the total power being delivered by the three machines in this area?
 - c) How much has the MW output of each machine changed?
 - d) Given that R of machine 1 is 0.04 on a 100 MVA base, what should the R values of machines 2 & 3 be changed to if it is desired that each of the three generators provides, on their respective bases, an equal portion of system load? State the R values on the base of the respective machines, as this is how an engineer must specify each machine's characteristics.