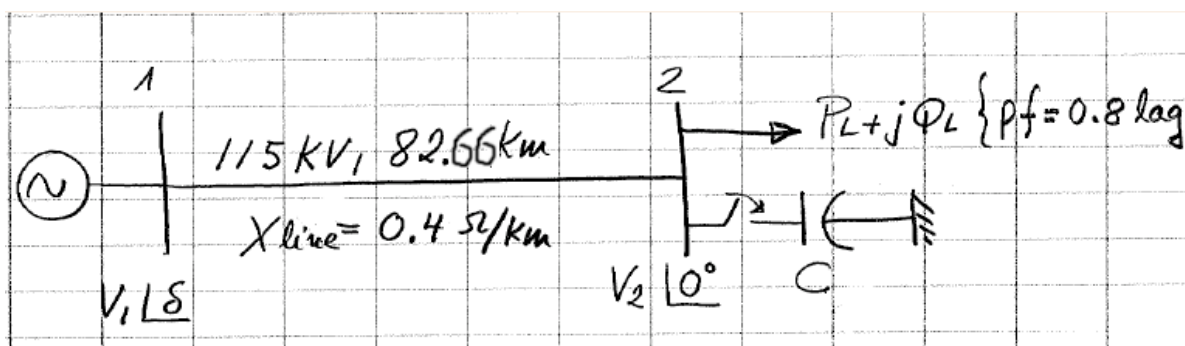


ASSIGNMENT No. 7

Tutorial Date: Tuesday 30th October
POWER TRANSFER

Consider the following power transmission system



System Base: 100 MVA, 115 kV at bus 1. Bus 1 is voltage regulated.

Using the power transfer formula $P_2 = \frac{V_1 V_2}{X} \sin \delta$ and the circle diagram at the receiving-end bus 2 answer the following questions:

1. With $V_2 = 1.0$ pu and $V_1 = 1.05$ pu, determine the maximum active power that can be transmitted without exceeding a transmission angle of $\delta = 30^\circ$.
2. Suppose the load P_L has the value calculated in 1). Taking now into account that Q_L is related to P_L by a power factor $pf = 0.8$ lagging, determine the reactive power Q_c (in MVAR) that must be provided by a bank of capacitors to satisfy the operating condition of 1), that is: $V_2 = 1.0$, $V_1 = 1.05$, $\delta = 30^\circ$, P_L as in 1, Q_L as required by the power factor. Calculate also the value of the capacitors C in μF assuming they are connected in star.
3. Suppose that in order to save money only half of the Q_c calculated in 2) is installed. What would now be the needed V_1 and δ to maintain $V_2 = 1.0$?