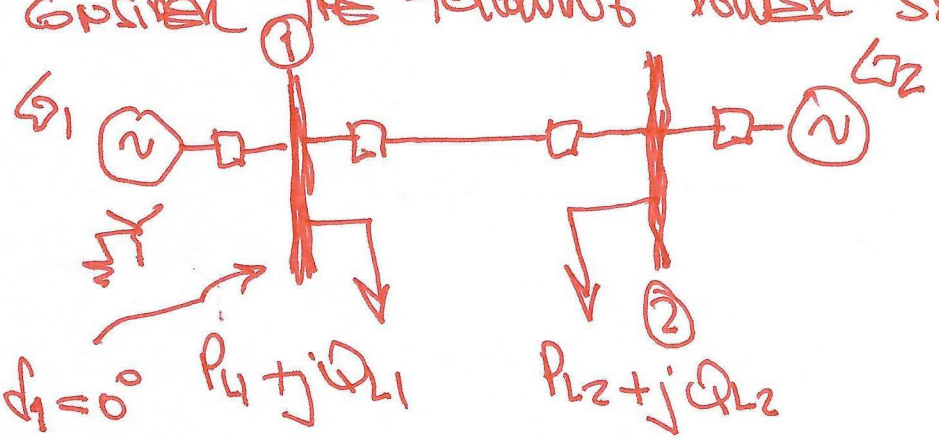
EXAMPLE: OPF

CONSIDER THE FOLLOWING POWER SYSTEM:



$P_{L1} = 3.0$ P.U
$Q_{L1} = 0.3$ P.U
$P_{L2} = 2.0$ P.U
$Q_{L2} = 0.2$ P.U

$$Y_{BUS} = j10\begin{bmatrix} -1 & 1 \\ 1 & -1 \end{bmatrix} \text{ P.U}$$

COST OF GENERATION:

$$C_1(P_{G1}) = 1 + P_{G1} + 3P_{G1}^2$$
$$C_2(P_{G2}) = 2 + 2P_{G2} + P_{G2}^2$$

OPERATING LIMITS:

$V_{min} \le |V_i| \le V_{max}, \quad i = 1, 2$

$V_{min} = 0.95$ PU
$V_{max} = 1.05$ PU

$0.5 \le P_{G1} \le 4.0$
$0.5 \le P_{G2} \le 3.5$
$-0.5 \le Q_{G1} \le 0.5$
$-0.6 \le Q_{G2} \le 0.6$
$-3.0 \le P_{12} \le +3.0$

FORMULATE THE OPTIMAL POWER FLOW PROBLEM, CONSIDERING MINIMIZING THE TOTAL COST OF THE SYSTEM.