

## EE 740 Term Project - Autumn 2005

Posted: 10/27/05

**Due dates: Part I: 11/22/05**

**Part II: 12/06/05**

A distribution system is shown in Figure 1.

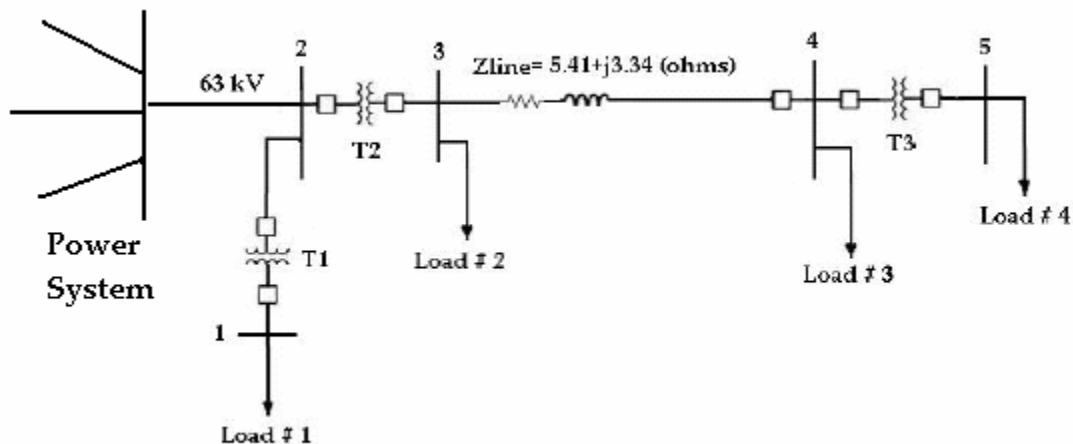


Figure 1

The necessary data to characterize transformers (T1, T2 and T3) and loads #1, 2, 3 and 4 (three-phase) is given below:

T1: 1 MVA, 63 kV / 20kV,  $X_{T1}=10\%$

T2: 10 MVA, 63 kV / 20 kV,  $X_{T2}=10\%$

T3: 500 KVA, 20 kV / 440 V,  $X_{T3}=5\%$

Load # 1: 500 KVA, p.f.= 0.9 (lagging)

Load # 2: 2 MVA, p.f.= 0.75 (lagging)

Load # 3: 2 MVA, p.f.= 0.75 (lagging)

Load # 4: 300 KVA, p.f.= 0.9 (leading)

### Part I:

- 1) Calculate the per-unit system using given base voltage 63kV on Bus 2 and base MVA value of 10 MVA for the entire system.
- 2) Calculate  $Y_{BUS}$  model of the system for power flow analysis.
- 3) Give Gauss-Seidel algorithm for solving the power flow problems of this system, assuming Bus 2 is the swing bus (equations only).

- 4) Calculate the voltages and injected powers (P and Q) on all 5 buses using MATLAB.

**Part II:** Repeat the above simulation using C/C++.

**Please note the following:**

- a) Your report must be typed.
- b) Give detailed mathematical modeling.
- c) Give sample calculations.
- d) Use tables to show all results.
- e) All programs must be attached as appendices.
- f) You can work as a team of two students. If choose to do so, you must submit an individual report with your teammate's name on it.