



The Ohio State University  
Department of Electrical Engineering

EE 341

**Energy Conversion**  
**Home work Set # 4**

**Print Your Name**

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**The Last Four Digits of Your OSU I.D. number :**

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1. (2-18, page 138) Three 25-kVA 24,000/277-V distribution transformers are connected in  $\Delta$ -Y. The open-circuit test was performed on the low-voltage side of this transformer bank, and the following data were recorded:

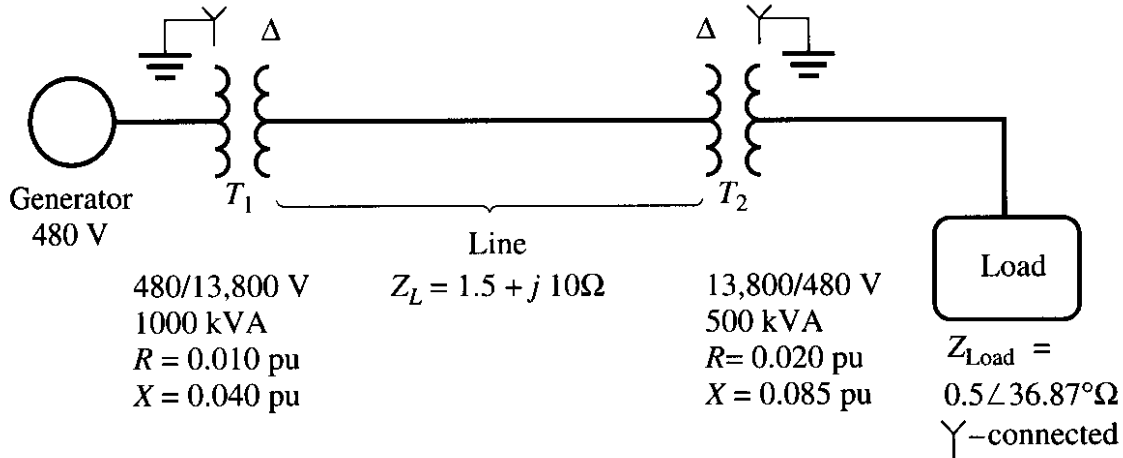
$$V_{line,OC} = 480 \text{ V} \quad I_{line,OC} = 4.10 \text{ A} \quad P_{3\phi,OC} = 945 \text{ W}$$

The short-circuit test was performed on the high-voltage side of this transformer bank, and the following data were recorded:

$$V_{line,SC} = 1400 \text{ V} \quad I_{line,SC} = 1.80 \text{ A} \quad P_{3\phi,SC} = 912 \text{ W}$$

- Find the per-unit equivalent circuit of this transformer bank.
- Find the voltage regulation of this transformer bank at the rated load and 0.90 PF lagging.
- What is the transformer bank's efficiency under these conditions?

2. The following figure shows a power system consisting of a three-phase 480-V 60-Hz generator supplying a load through a transmission line with a pair of transformers at either end.



- Sketch the per-phase equivalent circuit of this power system.
- Find the active power  $P$ , reactive power  $Q$ , and apparent (complex) power  $S$  supplied by the generator. What is the power factor of the generator?