

## EE 451 — Power Systems II

### Homework Assignment

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#### Part A: Research Essay on Tap-Changing Transformers

Prepare a short essay (maximum 3 pages) on the topic of **Tap-Changing Transformers**. Your essay must be written in paragraph form (not bullet points) and must include:

1. Definitions – explain what tap-changing transformers are and their function.
2. Equations – provide and explain relevant equations (e.g., per-unit voltage regulation, tap ratio adjustments).
3. Importance – discuss the role of tap changers in power system operation (voltage control, system stability).
4. Explanations – include discussion of both on-load tap changers (OLTC) and off-circuit tap changers, if applicable.
5. References – use formal referencing style (e.g., IEEE or APA). You may use material from Chapter 6 of Hadi Saadat's *Power System Analysis* and other credible sources.

#### Part B: Conceptual Question

Write a short paragraph explaining:

**“Why are power systems built with 3 phases (not 6, 9, or 7)?”**

Support your explanation with technical and practical reasons (efficiency, economics, symmetry).