IECE 513
Energy Systems

Mini-Design Problem
Transformers

Report Due March 27th, 2024

It is required to instrument a three-phase 10MVA 66kV/13.8kV, Δ-Y, 60Hz power transformer to monitor its input and output voltage.
Instrument transformers (potential and current transformers) are used to scale the voltage and current levels down so that they are suitable for interface to control and data logging circuitry.
Assuming the monitoring/control circuitry operates at a voltage level of 15V, please perform the following tasks:

1. Explain the construction principle of operation of current and potential transformers. You can use textbooks, research papers, industry white papers.. etc. to collect this information,
2. Select the proper ratings of current and potential transformers that would be needed to instrument this power transformer and sketch a diagram indicating the locations of the instrument transformers.
3. Specify the values of any passive components to be connected to the inputs/outputs of the instrument transformers.
4. At a block diagram level describe the analog and/or digital circuitry connected to the output of the instrument transformers to send to a monitoring computer:
    a. The input and output voltages of the power transformer.
    b. The input and output currents of the power transformer.
    c. The operating frequency
    d. The input and output power of the power transformer.
5. Bonus: Identify part numbers from component manufacturers for the instrument transformer ratings selected in part (2)

** Please submit a comprehensive report on the tasks above with each task in an independent section. Report should include a cover page, all calculations, figures and a list of references used.