ECE 3600 homework # 11

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1. A 3-phase system operates at $220\ \text{kVA}$ and $11\ \text{kV}$. (Values given in this way are 3-phase power and V_L, also recall that V_L is V_{LL}). Using these quantities to find base values, find the base current and base impedance for the system.

2. 2.19 If $25\ \Omega$ and $125\ \text{A}$ are the base impedance and base current, respectively, for a system, find the base kVA and base voltage.

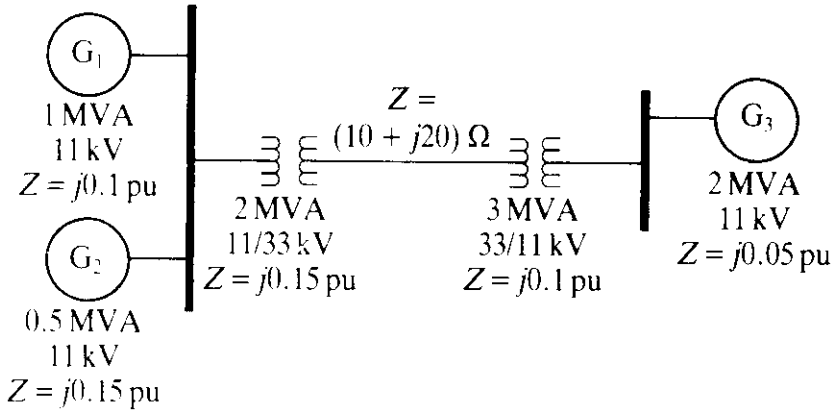
3. 2.20 The percent values of the voltage, current, impedance, and voltamperes for a given power system are 90, 30, 80, and 150 percent, respectively. The base current and base impedance are $60\ \text{A}$ and $40\ \Omega$, respectively. Calculate the actual values of the voltage, current, impedance, and voltamperes.

4. 2.21 A single-phase transmission line supplies a reactive load at a lagging power factor. The load draws $1.2\ \text{pu}$ current at $0.6\ \text{pu}$ voltage while drawing $0.5\ \text{pu}$ (true) power. If the base voltage is $20\ \text{kV}$ and the base current is $160\ \text{A}$, calculate the power factor and the ohmic value of the resistance of the load.

5. 2.25 A 100-kVA, $20/5\text{-kV}$ transformer has an equivalent impedance of 10 percent. Calculate the impedance of the transformer referred to
   a) the 20-kV side
   b) the 5-kV side.

6. 2.23 The one-line diagram for a two-generator system is shown. Redraw the diagram to show all values as per-unit values referred to a 7000-kVA base. See the transformers for the V_{base}s in the 3 regions.

   $S_{base} := 7 \cdot \text{MVA}$



Answers

1. $6.35\cdot\text{kV}$ $11.6\cdot\text{A}$ $550\cdot\Omega$
2. $390.6\cdot\text{kVA}$ $3.125\cdot\text{kV}$
3. $2160\cdot\text{V}$ $18\cdot\text{A}$
   $32\cdot\Omega$ $216\cdot\text{kVA}$
4. $69.4\cdot\%$ $43.4\cdot\Omega$
5. $400\cdot\Omega$ $25\cdot\Omega$
6.