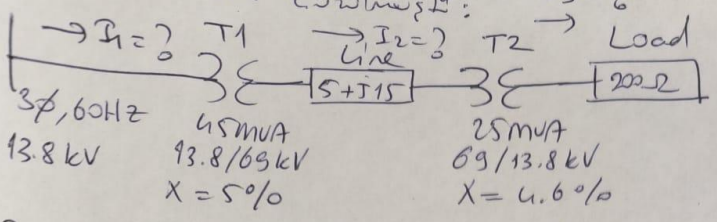
Bu soru deste cözülmüştür:




$V_{Base,new} = 13.8\,kV$ } given in the question.
$S_{Base,new} = 80\,MVA$ } primary side of T1.

Solution:

For T1:

$$Z_{pu,new} = (Z_{pu,old}) \left(\frac{S_{base\,new}}{S_{base\,old}}\right) \left(\frac{V_{base,old}^2}{V_{base,new}^2}\right)$$

$$= (j0.05) \left(\frac{80\,MVA}{45\,MVA}\right) \left(\frac{13.8\,kV}{13.8\,kV}\right)^2 = \boxed{A}\ pu$$

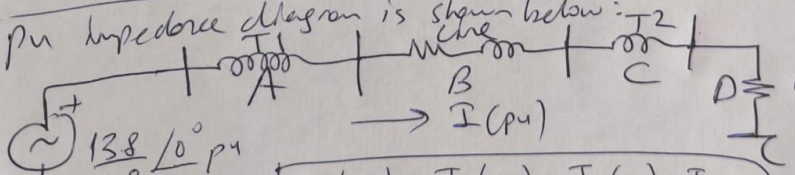
For Line: $Z_{line,pu} = \frac{Z_{line,actual}}{Z_{Base,line}} = \frac{5+j15}{\frac{V_{Base,new}^2}{S_{Base,new}}} = \frac{5+j15}{\frac{(69\,kV)^2}{80\,MVA}} =$

For T2: $Z_{pu,new} = (j0.046)\left(\frac{80\,MVA}{25\,MVA}\right)\left(\frac{69\,kV}{69\,kV}\right)^2 \rightarrow = \boxed{B}\ pu$

$\rightarrow = \boxed{C}\ pu$

For Load: $Z_{Load,pu} = \frac{Z_{load,actual}}{Z_{Base,load}} = \frac{200}{\frac{(13.8\,kV)^2}{80\,MVA}} = \boxed{D}\ pu$

pu impedance diagram is shown below:




$I(pu) = I_1(pu) = I_2(pu) = I_3(pu)$

$$I_{pu} = \frac{1\angle 0^\circ}{A+B+C+D} = \boxed{E}\ pu$$

$\rightarrow I_1(actual) = (I_{1,base})E = \_\_$
$\rightarrow I_2(actual) = (I_{2,base})E = \_\_$
$\rightarrow I_3(actual) = (I_{3,base})E = \_\_$

In this type of questions, it is important first to define Base values (voltage, powe) at each of each transformer.

| Source side (or T1 primary) | Line side (or T2 secondary or T1 prim.) |
|---|---|
| $V_{Base,new} = 13.8\,kV$ | $V_{Base,new} = 69\,kV$ |
| $V_{Base,old} = 13.8\,kV$ | $V_{Base,old} = 69\,kV$ |
| ~~$S_{Base,new} = 80\,MVA$~~ | $S_{Base,new} = 80\,MVA$ |
| $S_{Base,old} = 45\,MVA$ (for T1) | $S_{Base,old} = 45\,MVA$ (for T1) } if needed |
| | $S_{Base,old} = 25\,MVA$ (for T2) } if needed |

Load Side:

$V_{Base,new} = 13.8\,kV$

$V_{Base,old} = 13.8\,kV$ (due to the T2 src. rating)

$S_{Base,new} = 80\,MVA$

$S_{Base,old} = 25\,MVA$ (if needed)

$$\underbrace{I_{1,base}}_{\text{source side}} = \frac{S_{Base,new}}{(\sqrt{3})V_{Base,new}} = \frac{80\times10^6}{(\sqrt{3})(13800)} = \text{---- Amps}$$

$$\underbrace{I_{2,base}}_{\text{Line side}} = \frac{S_{Base,new}}{(\sqrt{3})V_{Base,new}} = \frac{80\times10^6}{(\sqrt{3})(69000)} = \text{--- Amps}$$

$$I_{3,base} = \frac{S_{Base,new}}{(\sqrt{3})V_{Base,new}} = \frac{80\times10^6}{(\sqrt{3})(13800)} = \text{---- Amps}$$