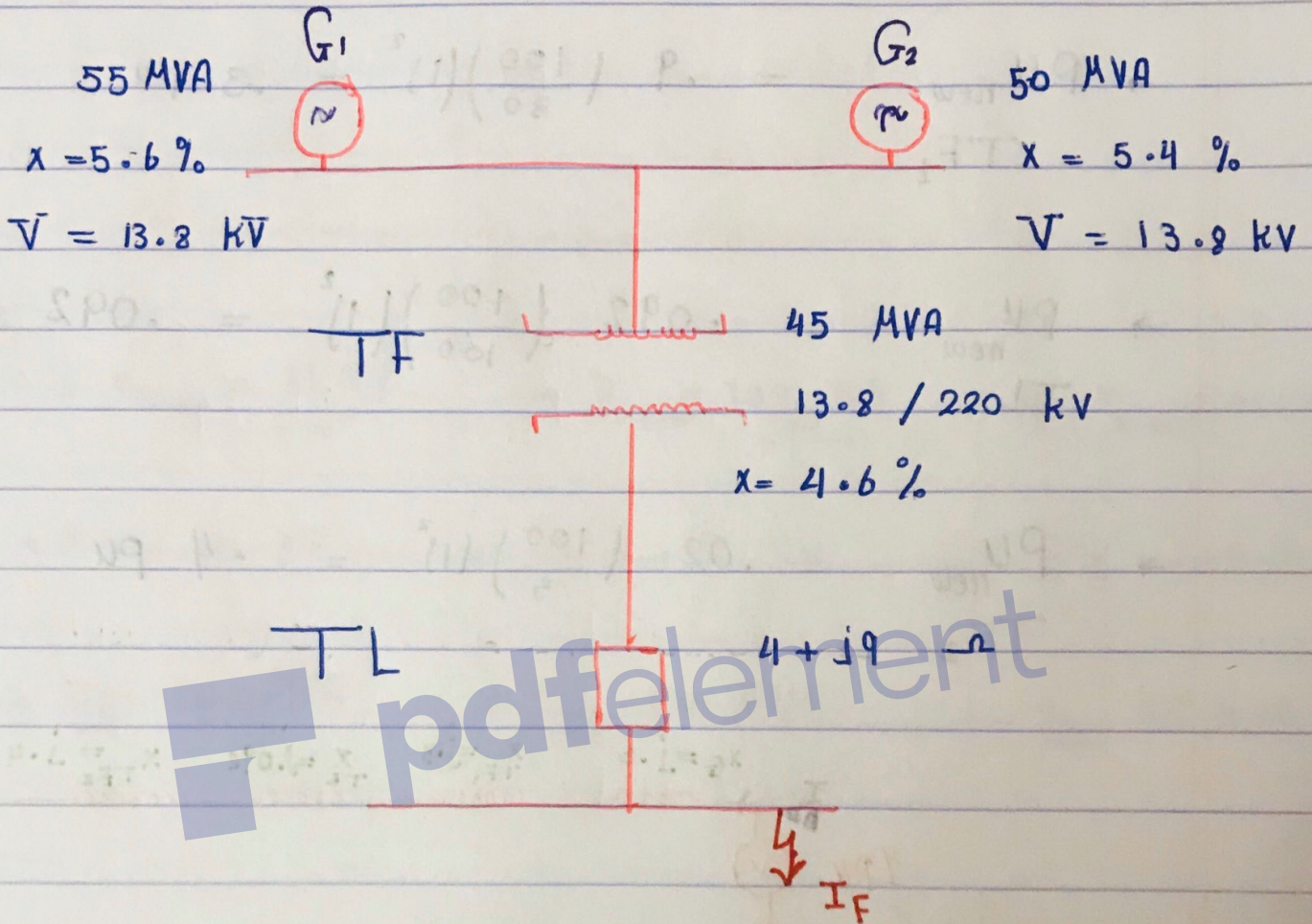


2. Mega Volt Amper (MVA) s_{\sim}

* Example *



Solution

S_{new} ← Transformer & generator

$$S_{\text{new}} = \frac{S}{x}$$

$$S_{\text{new}} = \frac{V^2}{z}$$

← Transmission Line

52

$$\rightarrow S_{G1 \text{ new}} = \frac{55 \text{ MVA}}{5.6\%} = 982 \text{ MVA}$$

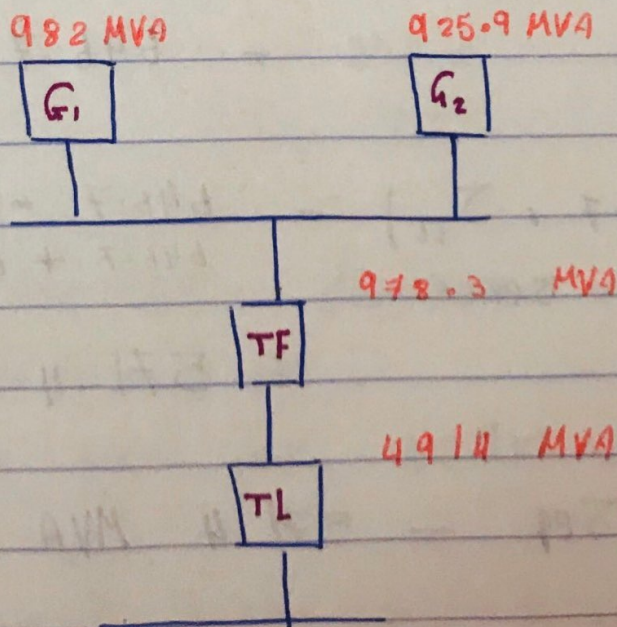
$$\rightarrow S_{G2 \text{ new}} = \frac{50 \text{ MVA}}{5.4\%} = 925.9 \text{ MVA}$$

$$\rightarrow S_{TF \text{ new}} = \frac{45 \text{ MVA}}{4.6\%} = 978.3 \text{ MVA}$$

جهد الملف الثاني لل TF ↓

$$\rightarrow S_{TL \text{ new}} = \frac{V^2}{Z} = \frac{(220 \text{ KV})^2}{\sqrt{9^2 + 4^2}} = 4914 \text{ MVA}$$

رسم النظام ←
 S_{new} على طول 20 ←
 pdfelement



(Seq) S يوجد في ←
 $I_F = \frac{S_{seq}}{V}$

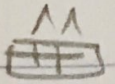
Note

To Find Seq

→ series $\rightarrow S_{eq} = \frac{S_1 S_2}{S_1 + S_2}$

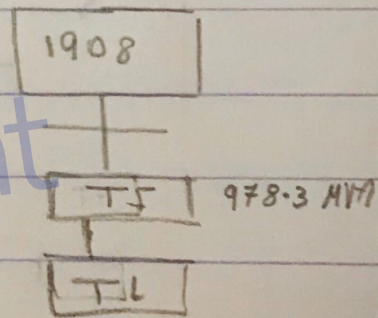
المقاومات

→ parallel $\rightarrow S_{eq} = S_1 + S_2$

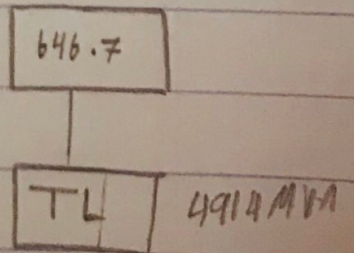


* (S_{G1}, S_{G2}) parallel = $S_{G1} + S_{G2}$
 = $982 + 926 = 1908 \text{ MVA}$

* $(1908, S_{TF})$ series = $\frac{1908 * 978.3}{1908 + 978.3}$
 = 646.7 MVA



* $(646.7, S_{TL})$ series = $\frac{646.7 * 4914}{646.7 + 4914}$
 = 571.4 MVA



$S_{eq} = 571.4 \text{ MVA}$

→ $I_F = \frac{S_{eq}}{\sqrt{2} V} = \frac{571.4 \text{ MVA}}{\sqrt{3} (220 \text{ kV})} = 1500 \text{ A}$

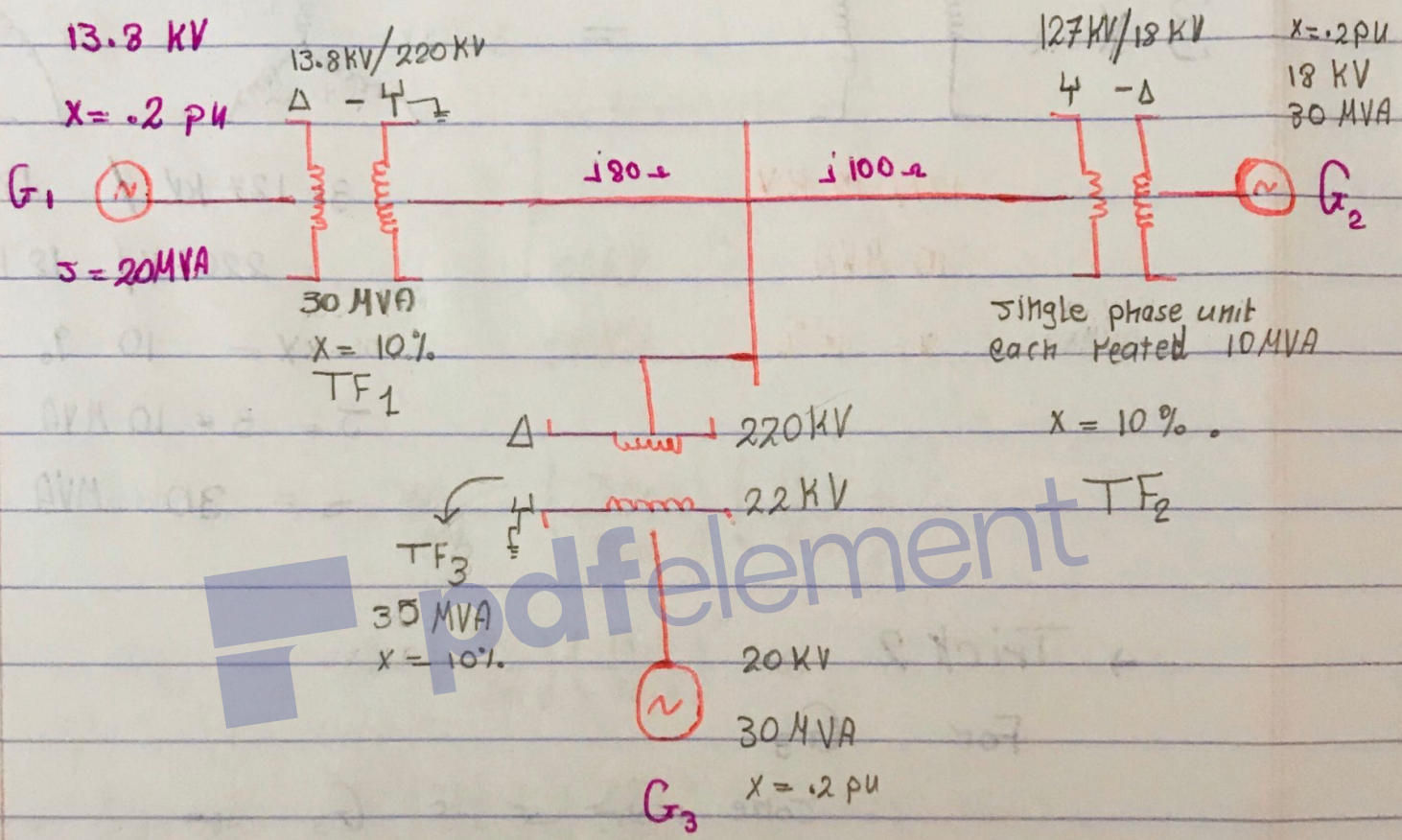
150 Fault

54

Example 8

10.10.2019

The single diagram of unloaded power system is shown in the figure. Reactance of the two sections of transmission line are shown in the figure.



Draw The impedance diagram with an reactances marked in pu. choose a base of 50 MVA.

Solution 0000

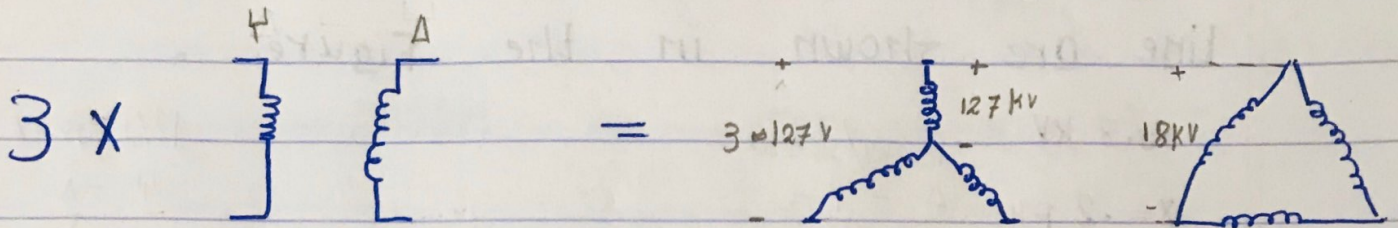
السؤال مهم جداً ويجب مثله في الفيرست
 السؤال فيو Trick = 3

→ Trick 1

For TF_2

one phase

للجزء



127 / 18 kV

10 MVA

$x = 10\%$

$3 * 127 \text{ kV} / 18 \text{ kV}$

220 kV / 18 kV

$x = 10\%$

$S = 3 * 10 \text{ MVA}$

$S = 30 \text{ MVA}$

→ Trick 2

For G_3

تكون غير متصلة G_3

TF_3 Sec

ف لا يوجد X_{G_3}

$$\frac{V_{old}}{V_{new}} \neq 1$$

→ Trick 3

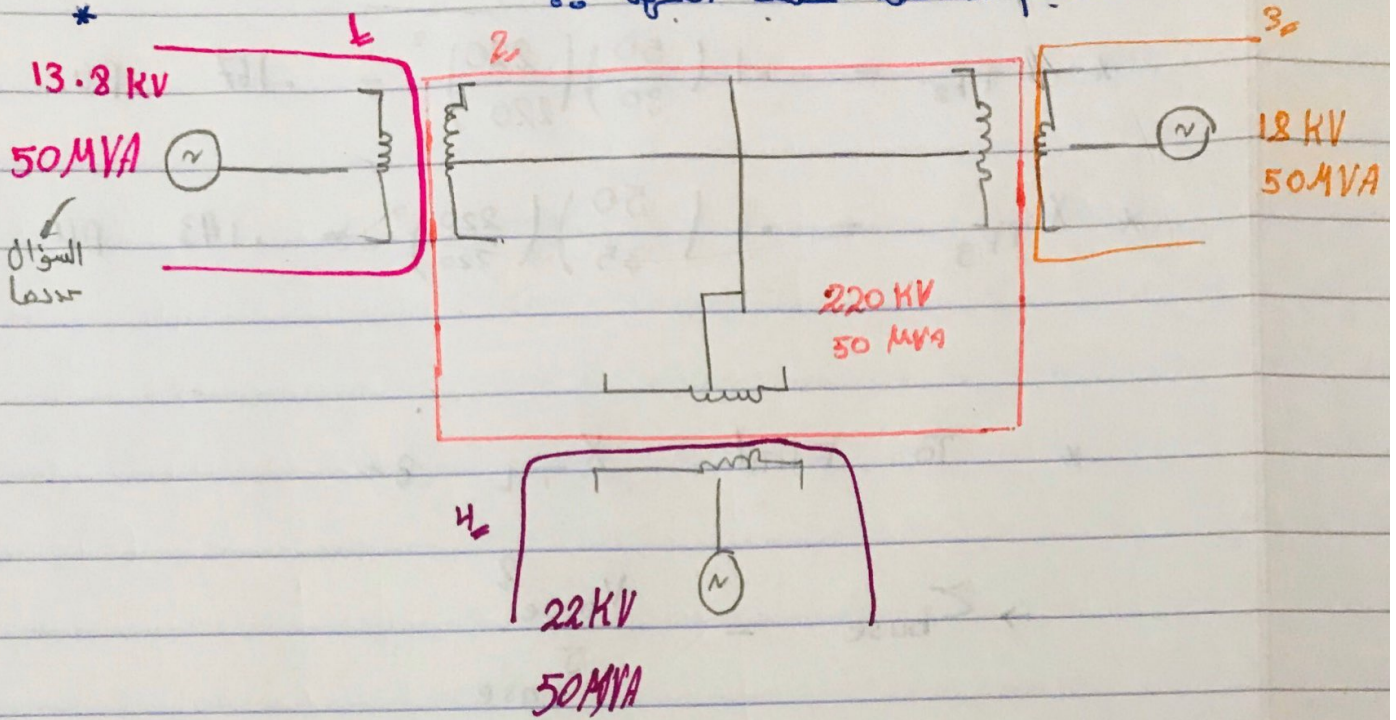
For Transmission Line (TL)

مكتوب القيمة الحقيقية للمقاومة متى pu

عندما يوجد pu ، بنسب القيمة الحقيقية لل base

بما يوجد لل base

1. تقسيم المناظرة حسب الجهود



$$X = p_{\text{old}} \left(\frac{S_{\text{new}}}{S_{\text{old}}} \right) \left(\frac{V_{\text{old}}}{V_{\text{new}}} \right)^2$$

$$* X_{G1} = 0.2 \left(\frac{50}{20} \right) \left(\frac{13.8}{13.8} \right)^2 = 0.5 \text{ pu}$$

$$* X_{G2} = 0.2 \left(\frac{50}{30} \right) \left(\frac{18}{18} \right)^2 = 0.333 \text{ pu}$$

$$* X_{G3} = 0.2 \left(\frac{50}{30} \right) \left(\frac{20}{22} \right)^2 = 0.275 \text{ pu}$$

$$* X_{TF1} = 0.1 \left(\frac{50}{25} \right) \left(\frac{13.8}{13.8} \right)^2 = 0.2 \text{ pu}$$

لواء الخريت
 V_{pri}
 او
 V_{sec}
 ما بتغير فضل

$$* X_{TF_2} = .1 \left(\frac{50}{30} \right) \left(\frac{220}{220} \right)^2 = .167 \text{ pu}$$

$$* X_{TF_3} = .1 \left(\frac{50}{35} \right) \left(\frac{220}{220} \right)^2 = .143 \text{ pu}$$

* To Find X_{TL} $8 \sim$

$$\rightarrow Z_{base} = \frac{V_{base}^2}{S_{base}}$$

$$= \frac{220^2 \text{ kv}}{50 \text{ MVA}} = 968 \Omega$$

$$\rightarrow X_{TL1} = \frac{80}{968} = .0826 \text{ pu}$$

$$\rightarrow X_{TL2} = \frac{100}{968} = .1033 \text{ pu}$$

