Department OF Electrical

Assignment

Date: 20/04/2020

Course detail

Course title: Power System Analysis

Instructor: Engr. Aamir Aman

Module: 6th

Student detail

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ID: 6990

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Q1 A 3ϕ transformer is connected with a residental load OF 28.56kv. the primary side of a transformer is connected with 130kv feeder while secondary side is stepped down to 10 kv. the transformer is vated with 30 MVA. find Impedance % Zb

Aus Given data:

A 3ϕ is connected to with residental load 28.56kV.

Primary side T/P 130 kV feeder

secondary side is stepdown 10kV.

Transformer vated 30MVA

Required data:

Find the Impedance Zb.

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Solution:

Primary P = 130 kV

Secondary S = 10 kV

Transformer Rated = 30 MVA

Zb across Vbase1 (130kV)

$$Zb = \frac{(130 \times 10^3)^2}{30\ MVA} = \frac{16900000000}{30000000}$$

$$\boxed{Zb = 56.33\ \Omega}$$

* Zb across Vbase (10kV)

$$Zb = \frac{(10 \times 10^3)^2}{30\ MVA}$$

$$= \frac{100000000}{30000000}$$

$$\boxed{Zb = 3.33\ \Omega}$$

Ans

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Kamran Khan # 6990

Q1/b Find the Per unit equivalent impedance of an 11/132 KV transformer having 10Ω and 1440Ω. the equivalent impedance the Primary and secondary currents are 909 Amp and 75-75 Amps respectively.

Ans

Given data:

11/132 KV transformer have 10Ω and 1440Ω equivalent impedance. Primary & secondary currents are 909 Amp & 75.75 Amp respectively.

Required data:

Find the Per unit equivalent impedence of an 11/132 KV transformer. are the above data.

Solution:

Primary 11/132 KV

Secondary

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$$I_{base_1} = \frac{S_{base1}}{V_{base1}}$$

$S_{base1} = V_{base_1} \times I_{base1}$

$= 11 \times 10^3 \times 99$ Amp

$S_{base_1} = 9999000$

* $S_{base_2} =$

$S_{base_2} = V_{base_2} \times I_{base_2}$

$= 132 \times 10^3 \times 75.75$ Amp

$S_{base_2} = 9999000$

* $Z_{base1} =$

$$Z_{base1} = \frac{(V_{base1})^2}{S_{base1}} = \frac{(11 \times 10^3)^2}{9999000}$$

$= 12.101$

$Z_{base1} = 12.101$

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Now Z_{base_2}

$$Z_{base_2} = \frac{(V_{base_2})^2}{S_{base_2}} = (132 \times 10^3)^2$$

$$= 1742.574$$

$$Z_{base_2} = 1742.574$$

* For the per unit equivalent impedance, for Z_{base_1}.

* Z_{base_1} eq. P.u $= \frac{Z_{eq_1}}{Z_{base_1}} = \frac{10\,\Omega}{12.101}$

Z_{base_1} eq. P.u $= 0.826$

* for the Z_{base_2},

Z_{base_2} eq.u $\frac{Z_{eq_2}}{Z_{base_2}} = \frac{1440\,\Omega}{1742.574}$

$= 0.826$

Z_{base_2} = eq. P.u = 0.826

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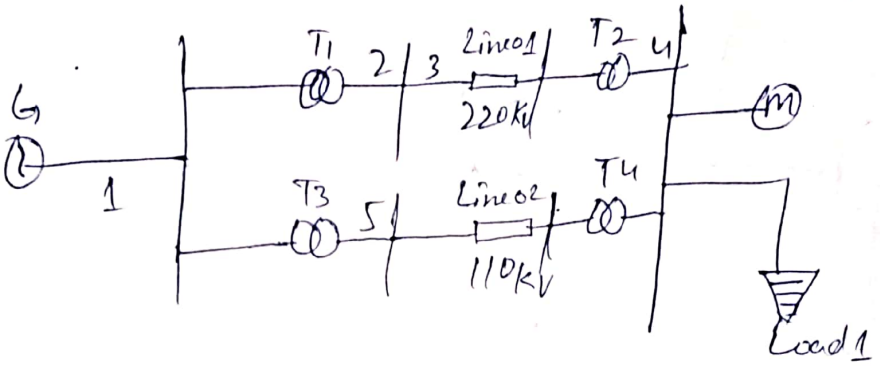
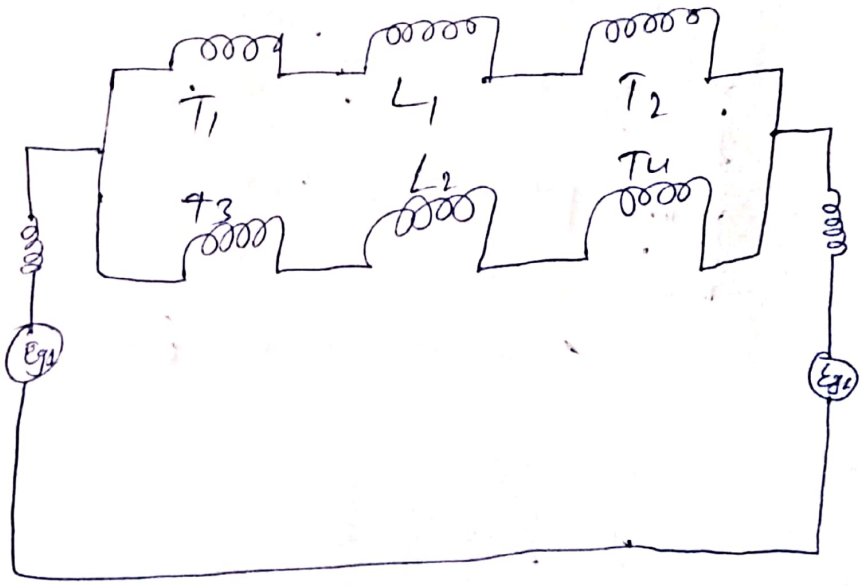
(Q2)(a) Single line diagram of a 3Φ Power System is shown in the below figure. Draw an Impedance and reactance diagram in Pu.



* This diagram will be converted into Reactance diagram



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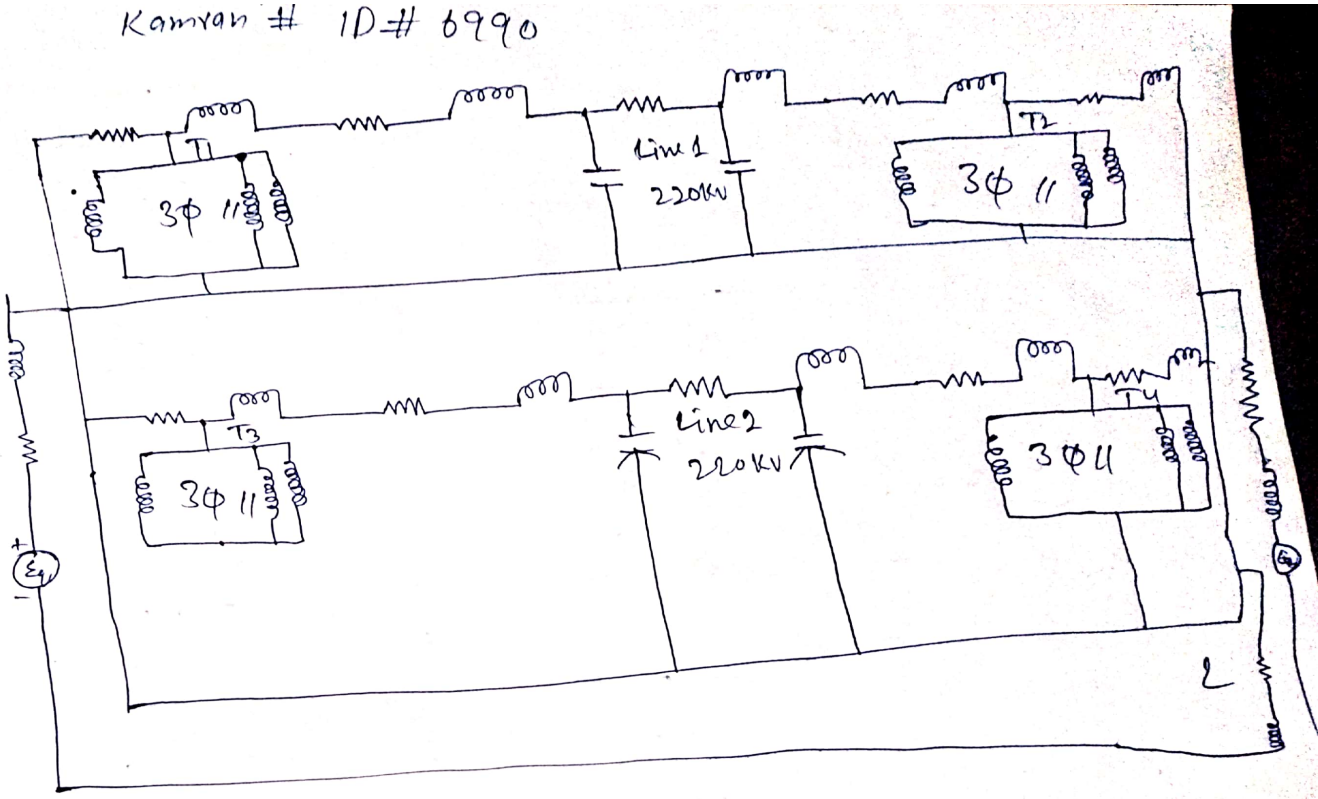
Single Line diagram Convert to the Impedance diagram.



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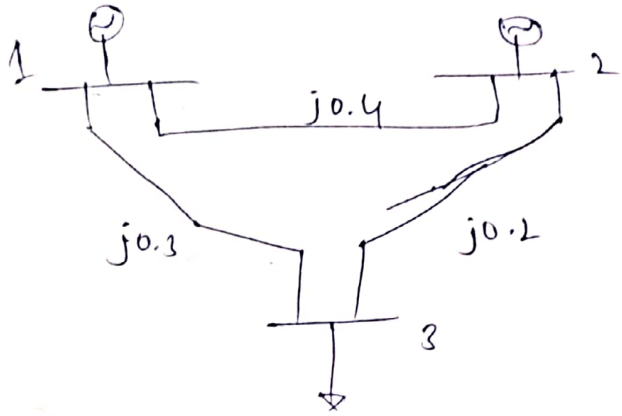
Q3/(a)

For the single line diagram shown below Generators are connected to high tension buses 1 and 2 and supply to load connected at bus 3- find the reactance diagram, then convert into equivalent current source and shunt admittance. Then find the admittance matrix and find the total current.



Ans!

Given data! single line diagram connected HT Bus 1 & 2 supply load connected at bus 3.

Required data! Find the reactance diagram converted into equivalent current source and shunt admitance. Find shunt admitance Matrix Find the total current.

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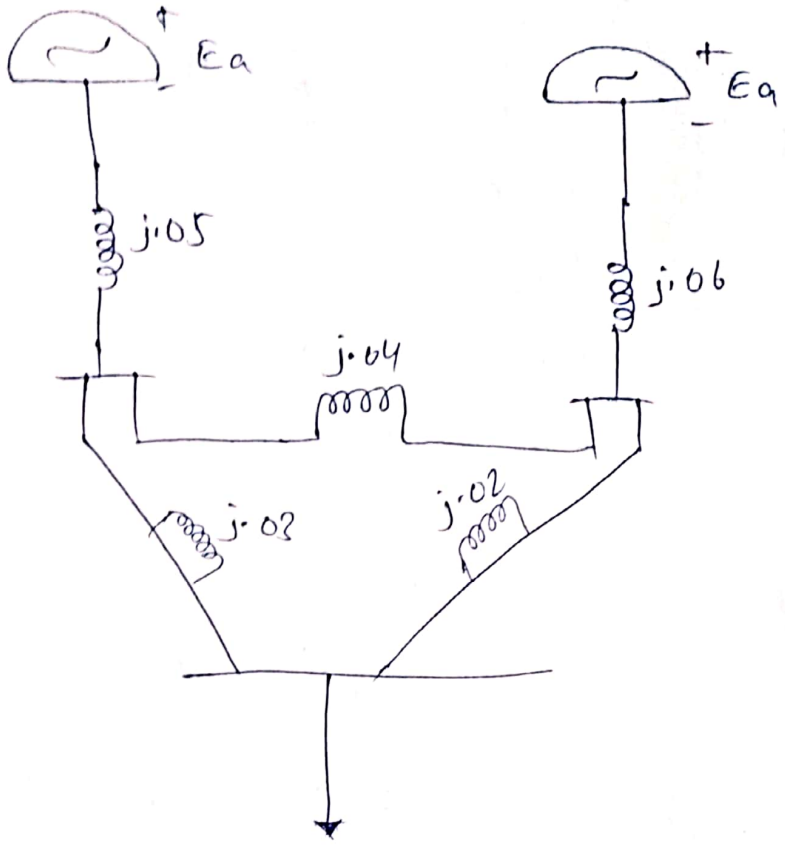
Solution!



Now Calculation!

$\frac{1}{j.06} = 160$ $\frac{1}{j.05} = 2$ $\frac{1}{j0.4} = 25$ $\frac{1}{j0.3} = 333$

$\frac{1}{j.0.2} = 5$

* So now we convert reactance diagrame in to Admittance.

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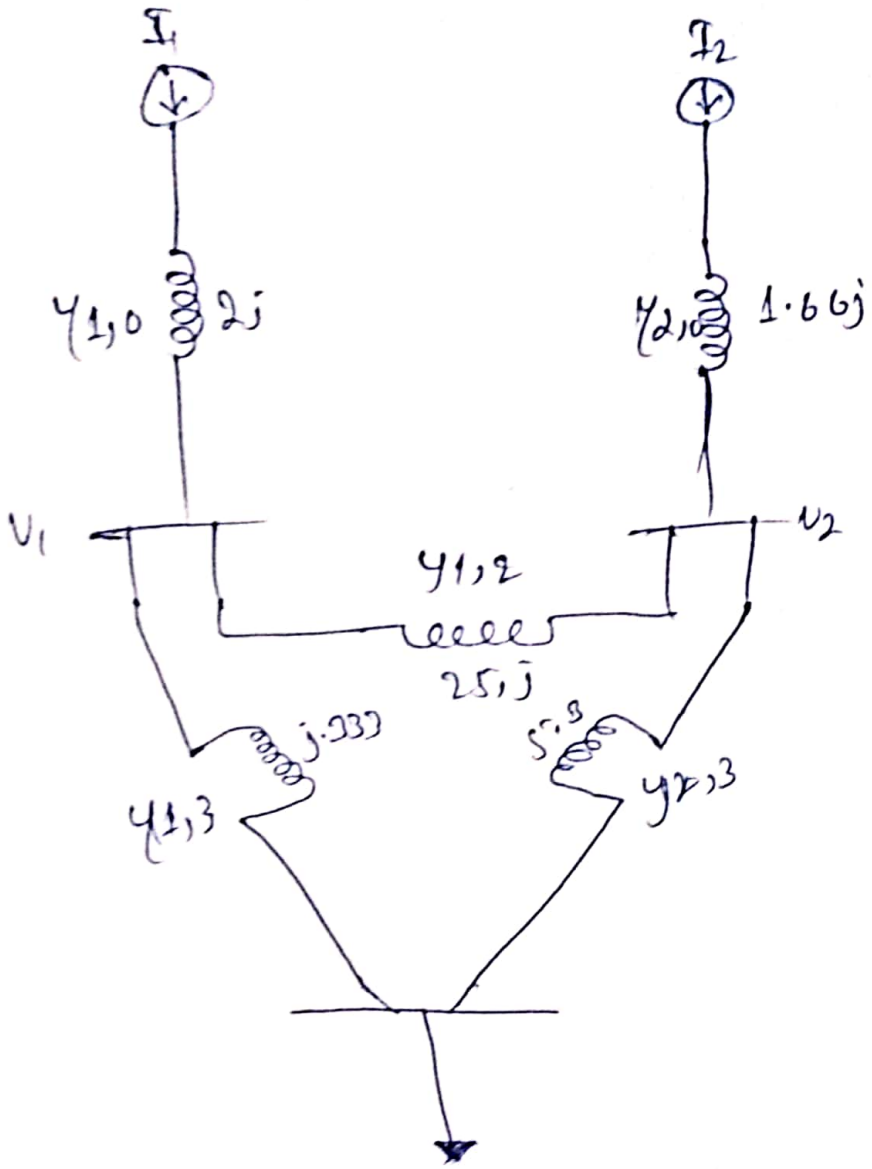
Kamran # 10 # 6990



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