

Assignment

Name

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ID

13880

Program

B-tech electronics

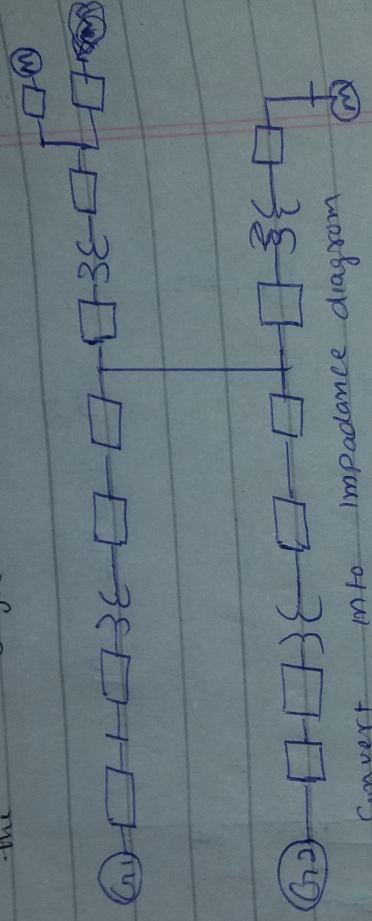
Subject

Power System

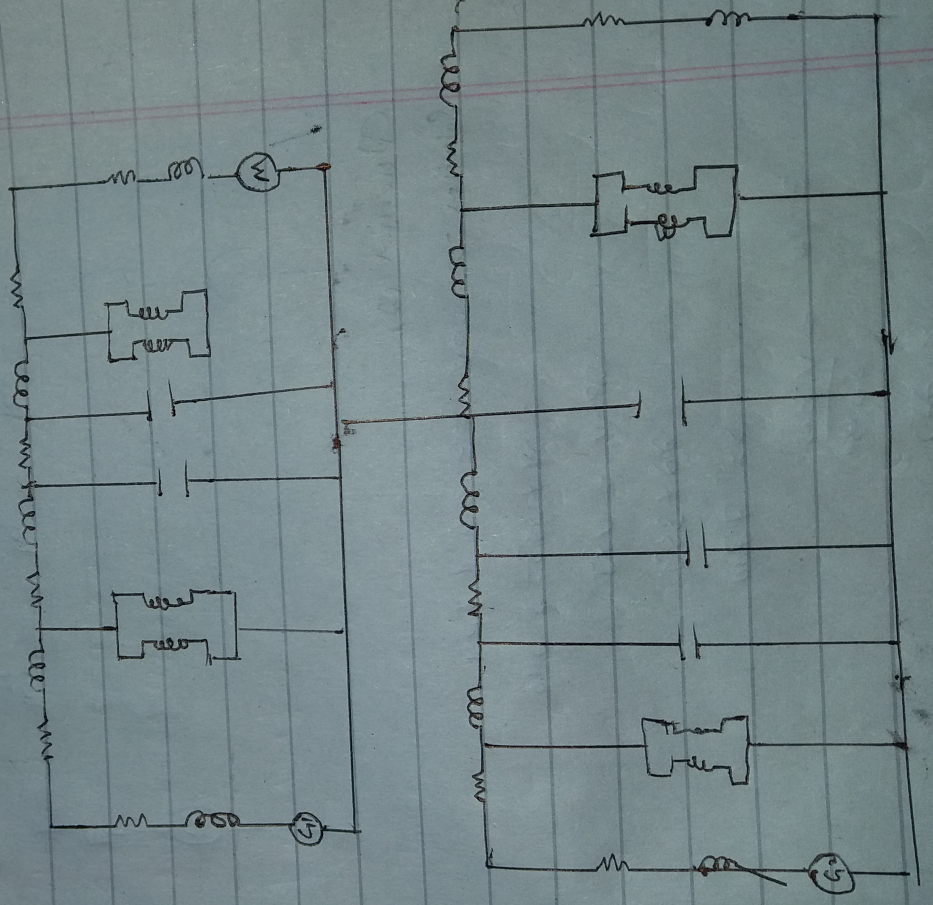
Submitted to

Engr. Amid-ur-Ram

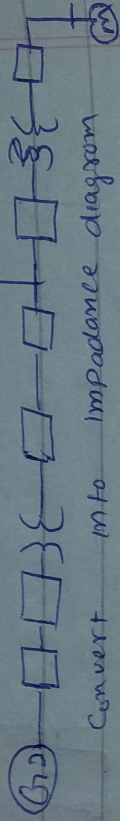
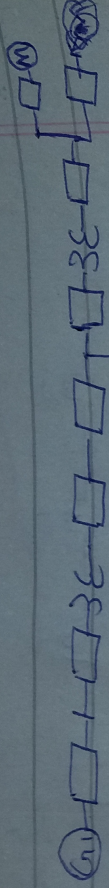
Q1) Prepare an Impedance diagram and Reactance diagram from the single line diagram



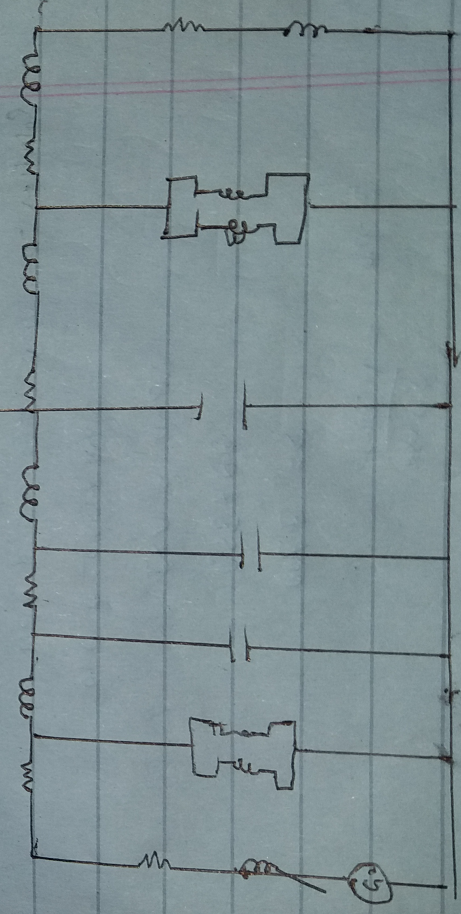
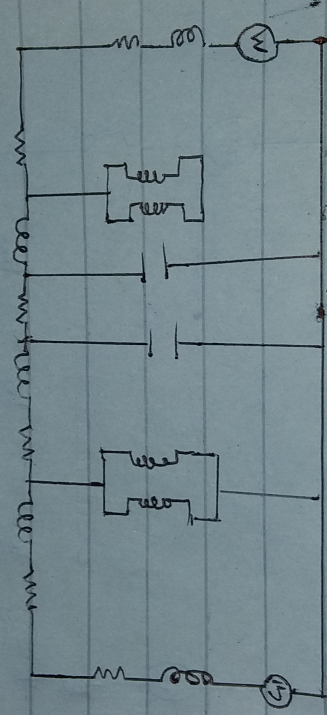
Q2) Convert into Impedance diagram



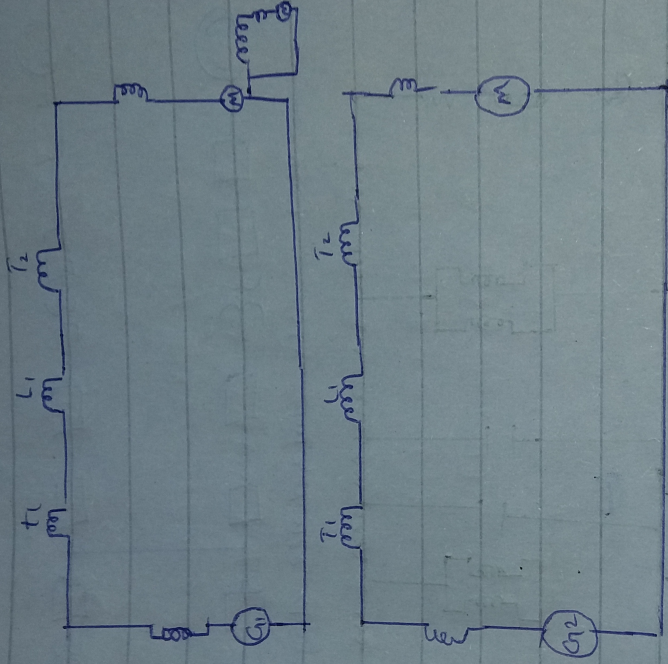
Qn Prepare an Impedance diagram and Reactance diagram from the single line diagram



Convert into Impedance diagram



Convert into Reactance diagram



Question (2)

$$\text{Solution} \Rightarrow V_{pu} = Z_{pu} \times I_{pu}$$

$$= 64 \times 350 = 22400$$

$$S_{pu} = V \times I$$

$$22 \times 350$$

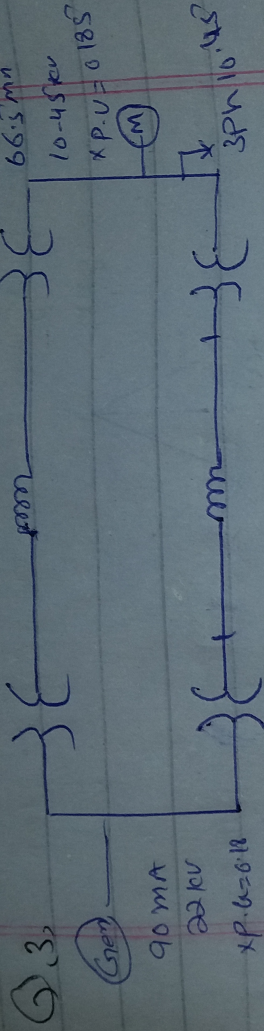
$$S = 7700$$

$$Z_{pu} = \frac{V_{base}}{S_{base}}$$

$$= \frac{(22)^2}{7700}$$

$$\frac{484}{7700}$$

$$\boxed{0.0628} \text{ Ans}$$



- T₁ 50 MVA 22/220 kV X.P.U. = 0.40
- T₂ 40 MVA 220/110 kV X.P.U. = 0.06
- T₃ 40 MVA 22/110 kV X.P.U. = 0.06
- T₄ 40 MVA 110/11 kV X.P.U. = 0.08
- Line 1 48.4 ohm (total)
- Line 2 68.43 ohm (total)

Calculations →

$$Z_{base} = \frac{KV_{base}^2}{Z_{base} MVA}$$

For T Line 1 $Z_{base} \left(\frac{220}{100} \right)^2 = 484 \text{ ohm}$

For T Line 2 $Z_{base} \left(\frac{110}{100} \right)^2 = 12 \text{ ohm}$

For 3-φ Load $Z_{base} = \frac{(11)^2}{100} = 1.21 \text{ ohm}$

$$Z_{P.U} = \frac{Z_{actual}}{Z_{base}}$$

$$Z_{P.U} = Z_{P.U. old} \left(\frac{S_{base new}}{S_{base old}} \right) \left(\frac{V_{base old}}{V_{base new}} \right)$$

For T Line 1 using $X L 1 P.U = \frac{48.4}{484} = 0.1 P.u$

For T Line 2 using $Cos \phi \times L 2 P.U = \frac{65.43}{121} = 0.5 P.u$

For 3 phase Load

Power factor $\cos^{-1}(\cos \phi) = \cos^{-1} 0.13$

$Z = \frac{(V \text{ rated})}{S} = \frac{10.45^2}{576 - 53.13}$

$= 0.4 \cdot 1415 + j 0.53267 \text{ ohm}$

$\frac{1.1445 + j 1.5326}{1.21}$

$0.945 + j 1.2667 P.u$

For generator the new per unit reactance evaluation

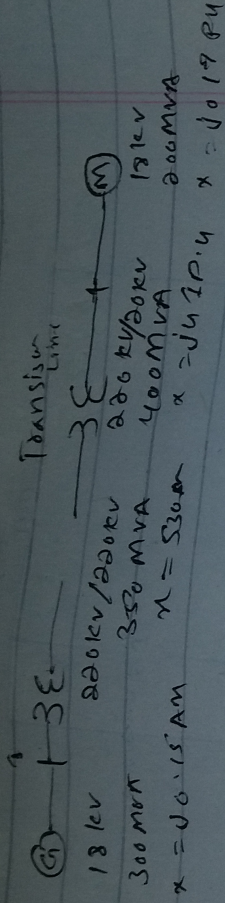
$X_s = 0.18 \left(\frac{100}{90} \right) \left(\frac{220}{220} \right)^2 = 0.22 P.u$

For T/F $T_1, X_{T1} = 0.1 \left(\frac{100}{90} \right) \left(\frac{220}{220} \right)^2 = 0.12 P.u$

For T/F $T_2, X_{L2} = 0.06 \left(\frac{100}{190} \right) \left(\frac{220}{220} \right)^2 = 0.15 P.u$

For T/F $T_3, X_{L3} = 0.064 \left(\frac{100}{40} \right) \left(\frac{220}{220} \right)^2 = 0.16 P.u$

For Motor $X_{SM} = 0.185 \left(\frac{100}{665} \right) \left(\frac{10.48}{11} \right)^2 = 10.25 P.u$



Sol: \rightarrow Pre fault

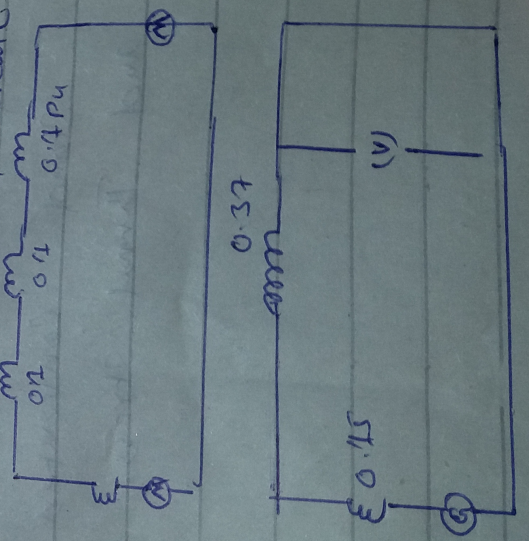
$$V_0 = \frac{17.8 \text{ kv}}{12.66} = 0.140$$

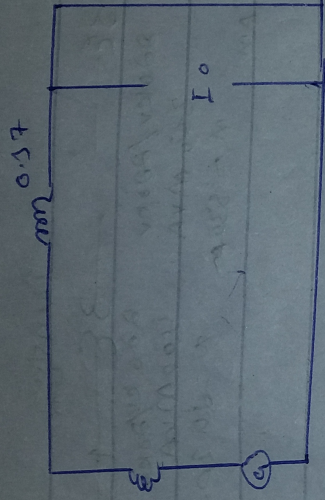
Reactance and apperent voltage are given in base 200MVA
 Load = 200 MVA, 0.80 Power factor leading

$$\frac{200}{10} = 20 \text{ pu}$$

$$\frac{10}{0.112} = \boxed{89.2857}$$

Doe fault evaluation circuit





B.G.)

Ans: \rightarrow Over Current protective Device must operate to Isolate Short Ckt fault Safty minimize damage to Ckt element and avoid if possible Shat down Plant An Accurate knowledge Fault Current through out the System is essential for the correct application of protective device and the design busbar and terminal arrangement to with Stand Convented meined and Thermal Stress.