Exercise I.

The transmitting sending end voltage in terms of line parameters can be separated as-

$$E_s = V_r \cos \phi_r + j Z_0 . L_i \sin \phi_r.$$

E_s = phase voltage at the transmitting end

V_r = phase voltage at the receiving end

θ_r. line length effect of Ferrati effect at the end of the line.

$$\frac{P - jQ}{V_0}$$

P = active Load

Q = reactive Load.

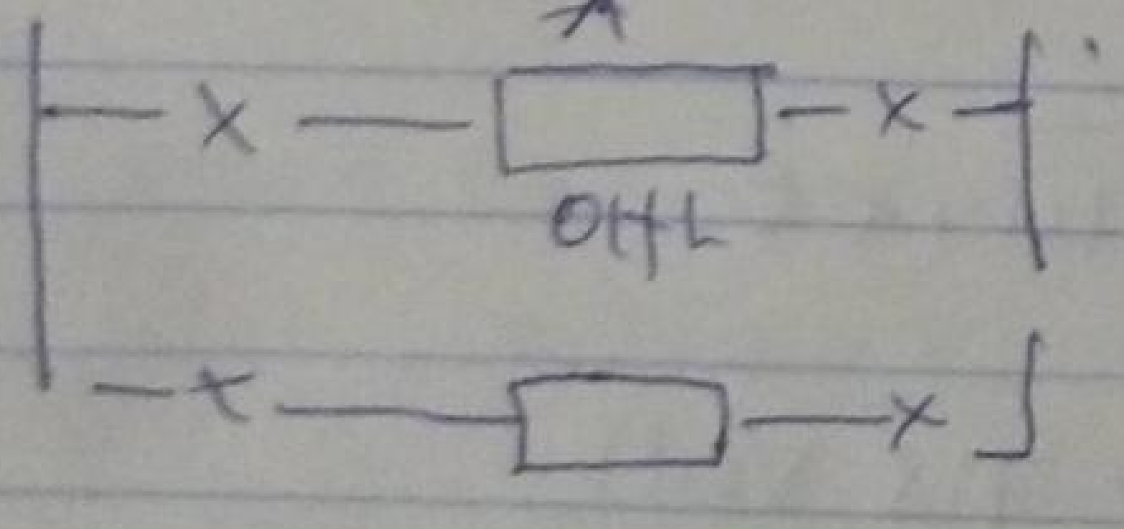
V_0 = Line Resistance perphase.

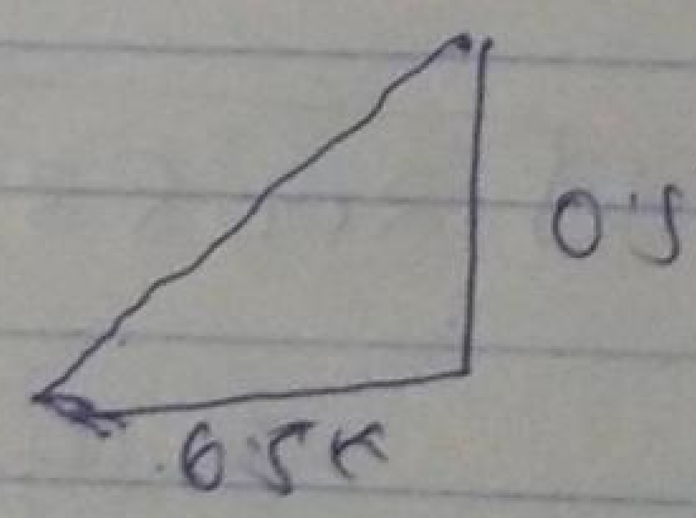
Z_0 = Surge impendance of the line.

$$E_s = \frac{400}{275} kv \cos \phi + j \left(\frac{0.01 \times 0.03}{0.0975 \times 0.195} \right) \left(\frac{8 MW}{100 MVA} \right) \sin \theta$$

$$0.145 kv \cos \phi + \left(\frac{0.0003}{0.0190125} \right) \times \underline{0.08} \sin \theta_r.$$

$$0.145 kv \cos \phi_r (0.0157791) \times 0.08 \sin \phi.$$





$$\sin = \frac{opp}{hy} \quad \frac{0.5}{6.5} = 0.076923 = 4.411^\circ$$

$$= 0.145 \cos 4.411 + 0.011265 \sin 4.441$$

$$= 144.4860 \text{ Volts}.$$

In UK power Quality regulation the declared Voltage and tolerance for electric supply should be 230 Volts.
The transformer tapping rating given on page 3 in beneficial because:
① The ratio of voltage can be varied without de-energizing the transformer.
② provides voltage control in the transformer
③ The rating increases the efficiency.
④ It can provide adjustment of voltage magnitude and flow of reactive

Question 2,

$$V_s = \sqrt{(V_R \cos \theta_r + IR)^2 + (V_R \sin \theta_R + IX_L)^2}$$

$$\sqrt{\left(\frac{275}{132} \text{ kV} \cos 4.411 + 100\right)^2 + \left(\frac{275}{132} \sin 4.411 + 100\right)^2}$$

$$= (0.20770 + 100)^2 + (0.016024 + 100)^2$$

$$100.207704^2 + 100.016024)^2$$

$$\sqrt{20083.14788}$$

$$= 141.715 \text{ volts}$$

(ii) The positive phase sequence (PP_s) substransient reactance of the syntems in feed on a 100MVA is ~~ta~~

$X_{Th} =$

$$XTh = \frac{1}{144.46} + \frac{1}{141.715}$$

$$= 0.006921 + 0.007056$$

$$= 0.013977 \text{ Volts.}$$

- In exercise two results the three alternating voltage has to be transformed into another, like frequency and number of phases. The resultance voltage results is the same value. In the values in exercise 1 the values is not the same for the resultant voltage. The load causes the transformation of of the power to be power.

Question 3.

a) $0.145 \cos 4.411 + 0.0157791\left(\frac{0.25}{100}\right) \sin 4.411$
$= 0.9994 \text{ V}$

b) $0.145 \cos 4.411 + 0.0157791\left(\frac{0.5}{100}\right) \sin 4.411$
$= 1.00 \text{ V}$

c) $0.145 \cos 4.411 + 0.0157791\left(\frac{0.515}{100}\right) \sin 4.411$
1.1 V

As the power is increased the sending end voltage also increases

The main cause of low power factor is the inductive load. As in pure inductive

Circuit, Current lags 90° from voltage. This large diffrent of phase angle between Current and Voltage Causes Zero power factor

→ Varrying Load in power System. → The Load on power System is Varying. During low Load periods, Supply Voltage is Increased Which Increases the Magnetizing Current Which Causes the decrease power factor.

→ The Simplest Way to Improve power factor is to add PFF Correction Capacitors to the electrical System. The PF Correction Capacitor acts as reactive Current generators. They help offset the non-Working power used by Inductive Loads hence Improving the power factor.