



Budapesti Műszaki és Gazdaságtudományi Egyetem
Villamosmérnöki és Informatikai Kar
Villamos Energetika Tanszék

Villamosenergia-rendszerek laboratórium II.
IX. mérés

Házi feladat

XYZ. mérőcsoport

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Szergej ITIS4U

DÁTUM

1.

Néveleges feszültség:

$$U_n = 11 \text{ kV}$$

Távvezeték

$$z_{vez} = 0.1 + j0.4 \text{ } \Omega/\text{km}$$

$$l_{vez} = k * 2 \text{ km} = 9 * 2 \text{ km} = 18 \text{ km}$$

Fogyasztó:

$$P_F = 2 \text{ MW}$$

$$\cos\varphi = 0.8 \text{ (ind.)} \quad \sin\varphi = 0.6$$

a)

$$S_F = \frac{P_F}{\cos\varphi} = \frac{2M}{0.8} = 2.5MVA$$

$$Q_F = S_F \sin\varphi = 2.5M \cdot 0.6 = 1.5Mvar$$

$$I = \frac{S_F}{\sqrt{3} \cdot U_n} (\cos\varphi - j\sin\varphi) = \frac{2.5M}{\sqrt{3} \cdot 11k} (0.8 - j0.6) = 131.2(0.8 - j0.6) = 105 - j78.7 [A]$$

$$\Delta U_{n(hossz)} = I_w R_{vez} + I_m X_{vez} = 105(0.1 \cdot 18) + 78.7(0.4 \cdot 18) = 755V_{fázis}$$

$$P_{vez} = 3 |I_n|^2 R_{vez} = 3(105^2 + 78.7^2)(0.1 \cdot 18) = 92.98kW$$

$$\cos\varphi' = 0.95 = \frac{P_F}{S'_F} = \frac{2M}{S'_F} \quad (\sin\varphi' = \sin(\arccos\varphi') = 0.31)$$

$$\Rightarrow S'_F = \frac{2M}{0.95} = 2.105MVA$$

$$\Rightarrow Q'_F = S'_F \sin\varphi' = 2.105M \cdot 0.31 = 0.657Mvar$$

$$\Rightarrow Q_C = Q'_F - Q_F = 0.657M - 1.5M = -0.842Mvar$$

b)

$$I' = \frac{S'_F}{\sqrt{3}U_n} (\cos\varphi' - j\sin\varphi') = \frac{2.105M}{\sqrt{3} \cdot 11k} (0.95 - j0.31) = 110.5(0.95 - j0.31) = 105 - j34.3 [A]$$

$$\Delta U'_{n(hossz)} = I'_w R_{vez} + I'_m X_{vez} = 105(0.1 \cdot 18) + 34.3(0.4 \cdot 18) = 436V_{fázis}$$

$$P'_{vez} = 3 |I_n'|^2 R_{vez} = 3(105^2 + 34.3^2)(0.1 \cdot 18) = 65.88kW$$

2.

Mögöttes: $S_z = 6000 \text{ MVA}$

Tr1: $\varepsilon = 10 \%$,
 $S_n = 160 \text{ MVA}$
 $U_n = 220/126 \text{ kV} (X_1 = X_2 = X_0)$
Yyn

Vez: $Z_1 = Z_2 = j0.4 \text{ } \Omega/\text{km}$
 $Z_0 = j1 \text{ } \Omega/\text{km}$
 $l_{\text{vez}} = k \cdot 5 \text{ km} = 9 \cdot 5 \text{ km} = 45 \text{ km}$

Tr2: $\varepsilon = 11 \%$,
 $S_n = 35 \text{ MVA}$
 $U_n = 126/6.6 \text{ kV} (X_1 = X_2 = X_0)$
Ynd
