LAMPIRAN

Perhitungan hari 1 sampai hari ke 30

Perhitungan hari ke 1

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{112,5 + 96,8 + 82,4}{3}$$

$$I_{rata} = 97,23 \text{ A}$$

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$$S = 1,732 \times 389,4 \times 97,23$$

$$S = 674,44 \times 97,23$$

$$S = 65.575,80\text{VA}$$

$$S = 65,58 \text{ kVA}$$

1. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$$R = r \times L$$

$$R = 0,868 \times 0,675$$

$$R = 0,5859\ \Omega$$

Sehingga :

$$P_{loss} = 112,5^2 \times 0,5859 + 96,8^2 \times 0,5859 + 82,4^2 \times 0,5859$$

$$P_{loss} = 12.656,25 \times 0,5859 + 9.370,24 \times 0,5859 + 6.789,76 \times 0,5859$$

$$P_{loss} = 7.415,3 + 5.490,0 + 3.978,1$$

$$P_{loss} = 16.883,4W$$

2. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$$P_N = (24,1)^2 \times 0,5859$$

$$P_N = 340,30 \text{ W}$$

3. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$$P_{loss} = P_{penghantar} + P_N$$

$$P_{loss} = 16.883,4 + 340,30$$

$$P_{loss} = 17.223,7\text{Watt}$$

$$P_{out} = S \times \cos \phi$$

$$P_{out} = 65.575,80 \times 0,85$$

$$P_{out} = 55.739,43 \text{ W}$$

$$P_{out} = 55,73 \text{ kW}$$

Persentase rugi–rugi daya :

$$\%\ P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{17.223,7}{55.739,43} \times 100\%$$
$$\% P_{loss} = 30,90\ \%$$

Perhitungan hari ke 2

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$
$$I_{rata} = \frac{114,3 + 97,6 + 83,5}{3}$$
$$I_{rata} = 98,47\ A$$

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$
$$S = 1,732 \times 388,7 \times 98,47$$
$$S = 673,22 \times 98,47$$
$$S = 66.291,97VA$$
$$S = 66,30\ kVA$$

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$
$$R = r \times L$$
$$R = 0,868 \times 0,675$$
$$R = 0,5859\ \Omega$$

Sehingga :

$$P_{loss} = 114,3^2 \times 0,5859 + 97,6^2 \times 0,5859 + 83,5^2 \times 0,5859$$
$$P_{loss} = 13.064,49 \times 0,5859 + 9.525,76 \times 0,5859 + 6.972,25 \times 0,5859$$
$$P_{loss} = 7.654,5 + 5.581,1 + 4.085,0$$
$$P_{loss} = 17.320,6W$$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$
$$P_N = (24,6)^2 \times 0,5859$$
$$P_N = 354,57\ W$$

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$
$$P_{loss} = P_{penghantar} + P_N$$
$$P_{loss} = 17.320,6 + 354,57$$
$$P_{loss} = 17.675,17Watt$$

$$P_{out} = S \times \cos \phi$$
$$P_{out} = 66.291,97 \times 0,85$$
$$P_{out} = 56.347,17\ W$$
$$P_{out} = 56,36\ kW$$

Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{17.675,17}{56.348,17} \times 100\%$$

$$\% P_{loss} = 31,37\ \%$$

Perhitungan hari ke 3

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{115,7 + 98,9 + 84,8}{3}$$

$$I_{rata} = 99,80A$$

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$$S = 1,732 \times 387,7 \times 99,80$$

$$S = 671,50 \times 99,80$$

$$S = 67.015,7VA$$

$$S = 67,02\ kVA$$

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$$R = r \times L$$

$$R = 0,868 \times 0,675$$

$$R = 0,5859\ \Omega$$

Sehingga :

$$P_{loss} = 115,7^2 \times 0,5859 + 98,9^2 \times 0,5859 + 84,8^2 \times 0,5859$$

$$P_{loss} = 13.386,5 \times 0,5859 + 9.781,2 \times 0,5859 + 7.191,0 \times 0,5859$$

$$P_{loss} = 7.843,2 + 5.730,8 + 4.213,2$$

$$P_{loss} = 17.787,2W$$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$$P_N = (25,0)^2 \times 0,5859$$

$$P_N = 366,19\ W$$

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$$P_{loss} = P_{penghantar} + P_N$$

$$P_{loss} = 17.787,2 + 366,19$$

$$P_{loss} = 18.153,40Watt$$

$$P_{out} = S \times \cos \phi$$

$$P_{out} = 67.015,7 \times 0,85$$

$$P_{out} = 56.963,35\ W$$

$$P_{out} = 56,96\ kW$$

Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{18.153,40}{56.963,35} \times 100\%$$

$$\% P_{loss} = 31,87\ \%$$

Perhitungan hari ke 4

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{116,8 + 100,2 + 85,7}{3}$$

$$I_{rata} = 100,90A$$

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$$S = 1,732 \times 386,4 \times 100,90$$

$$S = 669,24 \times 100,90$$

$$S = 67.526,32VA$$

$$S = 67,53\ kVA$$

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$$R = r \times L$$

$$R = 0,868 \times 0,675$$

$$R = 0,5859\ \Omega$$

Sehingga :

$$P_{loss} = 116,8^2 \times 0,5859 + 100,2^2 \times 0,5859 + 85,7^2 \times 0,5859$$

$$P_{loss} = 13.642,24 \times 0,5859 + 10.040,04 \times 0,5859 + 7.344,49 \times 0,5859$$

$$P_{loss} = 7.992,98 + 5.882,46 + 4.303,14$$

$$P_{loss} = 18.178,6\ W$$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$$P_N = (25,3)^2 \times 0,5859$$

$$P_N = 375,03\ W$$

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$$P_{loss} = P_{penghantar} + P_N$$

$$P_{loss} = 18.178,6 + 375,03$$

$$P_{loss} = 18.553,63Watt$$

$$P_{out} = S \times \cos \phi$$

$$P_{out} = 67.526,32 \times 0,85$$

$$P_{out} = 57.397,37\ W$$

P_{out} = 57,40 kW
Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{18.553,63}{57.397,37} \times 100\%$$

$$\% P_{loss} = 32,32\ \%$$

Perhitungan hari 5

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{118,1 + 101,4 + 86,6}{3}$$

$$I_{rata} = 102,03A$$

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$$S = 1,732 \times 387,7 \times 102,03$$

$$S = 671,50 \times 102,03$$

$$S = 68.513,15VA$$

$$S = 68,51kVA$$

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$$R = r \times L$$

$$R = 0,868 \times 0,675$$

$$R = 0,5859\ \Omega$$

Sehingga :

$$P_{loss} = 118,1^2 \times 0,5859 + 101,4^2 \times 0,5859 + 86,6^2 \times 0,5859$$

$$P_{loss} = 13.947,61 \times 0,5859 + 10.281,96 \times 0,5859 + 7.499,56 \times 0,5859$$

$$P_{loss} = 8.171,90 + 6.024,20 + 4.393,99$$

$$P_{loss} = 18.590,1W$$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$$P_N = (25,8)^2 \times 0,5859$$

$$P_N = 389,99W$$

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$$P_{loss} = P_{penghantar} + P_N$$

$$P_{loss} = 18.590,1 + 389,99$$

$$P_{loss} = 18.980,10Watt$$

$$P_{out} = S \times \cos \phi$$

$$P_{out} = 68.513,15 \times 0,85$$

P_{out} = 58.236,18 W
P_{out} = 58,24 kW
Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{18.980,10}{58.236,18} \times 100\%$$

$$\% P_{loss} = 32,59\ \%$$

Perhitungan hari 6

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{119,5 + 102,8 + 87,3}{3}$$

$$I_{rata} = 103,20A$$

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$$S = 1,732 \times 388,3 \times 103,20$$

$$S = 672,54 \times 103,20$$

$$S = 69.406,13VA$$

$$S = 69,41kVA$$

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$$R = r \times L$$

$$R = 0,868 \times 0,675$$

$$R = 0,5859\ \Omega$$

Sehingga :

$$P_{loss} = 119,5^2 \times 0,5859 + 102,8^2 \times 0,5859 + 87,3^2 \times 0,5859$$

$$P_{loss} = 14.280,25 \times 0,5859 + 10.567,84 \times 0,5859 + 7.621,29 \times 0,5859$$

$$P_{loss} = 8.366,80 + 6.191,70 + 4.465,31$$

$$P_{loss} = 19.023,81W$$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$$P_N = (26,2)^2 \times 0,5859$$

$$P_N = 402,19W$$

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$$P_{loss} = P_{penghantar} + P_N$$

$$P_{loss} = 19.023,81 + 402,19$$

$$P_{loss} = 19.426\ \text{Watt}$$

$$P_{out} = S \times \cos \phi$$

P_{out} = 69.406,13 × 0,85
P_{out} = 58.995,21 W
P_{out} = 58,99 kW
Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{19.426}{58.995,21} \times 100\%$$

$$\% P_{loss} = 32,93\ \%$$

Perhitungan hari 7

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{120,7 + 103,5 + 88,4}{3}$$

$$I_{rata} = 104,20A$$

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$$S = 1,732 \times 389,5 \times 104,20$$

$$S = 674,61 \times 104,20$$

$$S = 70.294,36VA$$

$$S = 70,29kVA$$

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$$R = r \times L$$

$$R = 0,868 \times 0,675$$

$$R = 0,5859\ \Omega$$

Sehingga :

$$P_{loss} = 120,7^2 \times 0,5859 + 103,5^2 \times 0,5859 + 88,4^2 \times 0,5859$$

$$P_{loss} = 14.568,49 \times 0,5859 + 10.712,25 \times 0,5859 + 7.814,56 \times 0,5859$$

$$P_{loss} = 8.535,68 + 6.276,31 + 4.578,55$$

$$P_{loss} = 19.390,54W$$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$$P_N = (26,5)^2 \times 0,5859$$

$$P_N = 411,45W$$

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$$P_{loss} = P_{penghantar} + P_N$$

$$P_{loss} = 19.390,54 + 411,45$$

$$P_{loss} = 19.801,99\ \text{Watt}$$

$$P_{out} = S \times \cos \phi$$

$P_{out} = 70.294,36 \times 0,85$

$P_{out} = 59.750,21$ W

$P_{out} = 59,75$kW

Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{19.801,99}{59.750,21} \times 100\%$$

$\% P_{loss} = 33,14\ \%$

Perhitungan hari 8

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{121,6 + 104,2 + 89,1}{3}$$

$I_{rata} = 104,97$A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1,732 \times 390,1 \times 104,97$

$S = 675,65 \times 104,97$

$S = 70.922,98$VA

$S = 70,92$kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$R = r \times L$

$R = 0,868 \times 0,675$

$R = 0,5859\ \Omega$

Sehingga :

$P_{loss} = 121,6^2 \times 0,5859 + 104,2^2 \times 0,5859 + 89,1^2 \times 0,5859$

$P_{loss} = 14.786,56 \times 0,5859 + 10.857,64 \times 0,5859 + 7.938,81 \times 0,5859$

$P_{loss} = 8.663,45 + 6.361,49 + 4.651,35$

$P_{loss} = 19.676,4W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$P_N = (26,8)^2 \times 0,5859$

$P_N = 420,82$W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$

$P_{loss} = 19.676,4 + 420,82$

$P_{loss} = 20.097{,}2 Watt$

$$P_{out} = S \times \cos \phi$$

$P_{out} = 70.922{,}98 \times 0{,}85$
$P_{out} = 60.284{,}53\ W$
$P_{out} = 60{,}28 kW$
Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{20.097{,}2}{60.284{,}53} \times 100\%$$
$\% P_{loss} = 33{,}34\%$

Perhitungan hari 9

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{122{,}4 + 105{,}1 + 89{,}6}{3}$$
$I_{rata} = 105{,}70A$

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1{,}732 \times 388{,}7 \times 105{,}70$
$S = 673{,}23 \times 105{,}70$
$S = 71.160{,}41VA$
$S = 71{,}16kVA$

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0{,}868 \times 0{,}675$
$R = 0{,}5859\ \Omega$
Sehingga :
$P_{loss} = 122{,}4^2 \times 0{,}5859 + 105{,}1^2 \times 0{,}5859 + 89{,}6^2 \times 0{,}5859$
$P_{loss} = 14.981{,}76 \times 0{,}5859 + 11.046{,}01 \times 0{,}5859 + 8.028{,}16 \times 0{,}5859$
$P_{loss} = 8.777{,}81 + 6.471{,}86 + 4.703{,}70$
$P_{loss} = 19.953{,}4W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$P_N = (27{,}0)^2 \times 0{,}5859$
$P_N = 427{,}12W$

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$

$P_{loss} = 19.953{,}4 + 427{,}12$
$P_{loss} = 20.380{,}5 Watt$

$$P_{out} = S \times \cos \phi$$

$P_{out} = 71.160{,}41 \times 0{,}85$
$P_{out} = 60{,}486{,}35\ W$
$P_{out} = 60{,}49 kW$
Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{20.380{,}5}{60.486{,}35} \times 100\%$$
$\% P_{loss} = 33{,}69\%$

Perhitungan hari 10

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{123{,}1 + 105{,}8 + 90{,}1}{3}$$
$I_{rata} = 106{,}33A$

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1{,}732 \times 387{,}8 \times 106{,}33$
$S = 671{,}67 \times 106{,}33$
$S = 71.418{,}67VA$
$S = 71{,}42kVA$

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0{,}868 \times 0{,}675$
$R = 0{,}5859\ \Omega$
Sehingga :
$P_{loss} = 123{,}1^2 \times 0{,}5859 + 105{,}8^2 \times 0{,}5859 + 90{,}1^2 \times 0{,}5859$
$P_{loss} = 15.153{,}61 \times 0{,}5859 + 11.193{,}64 \times 0{,}5859 + 8.118{,}01 \times 0{,}5859$
$P_{loss} = 8.878{,}50 + 6.558{,}35 + 4.756{,}34$
$P_{loss} = 20.193{,}2W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$P_N = (27{,}3)^2 \times 0{,}5859$
$P_N = 436{,}67W$

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 20.193,2 + 436,67$
$P_{loss} = 20.629,9 Watt$

$$P_{out} = S \times \cos \phi$$

$P_{out} = 71.418,67 \times 0,85$
$P_{out} = 60,705,87$ W
$P_{out} = 60,71$kW
Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{20.629,9}{60,705,87} \times 100\%$$
$\% P_{loss} = 33,98\%$

Perhitungan hari 11

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{124,2 + 106,5 + 90,8}{3}$$
$I_{rata} = 107,17$ A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1,732 \times 386,8 \times 107,17$
$S = 669,94 \times 107,17$
$S = 71.797,47$VA
$S = 71,79$ kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0,868 \times 0,675$
$R = 0,5859\ \Omega$
Sehingga :
$P_{loss} = 124,2^2 \times 0,5859 + 106,5^2 \times 0,5859 + 90,8^2 \times 0,5859$
$P_{loss} = 15.425,64 \times 0,5859 + 11.342,25 \times 0,5859 + 8.244,64 \times 0,5859$
$P_{loss} = 9.037,88 + 6.645,42 + 4.830,53$
$P_{loss} = 20.513,84\ W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$P_N = (27,6)^2 \times 0,5859$
$P_N = 446,32$ W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 20.513,84 + 446,32$
$P_{loss} = 20.960,2Watt$

$$P_{out} = S \times \cos \phi$$

$P_{out} = 71.797,47 \times 0,85$
$P_{out} = 61.027,85$ W
$P_{out} = 61,03$ kW
Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{20.960,2}{61.027,85} \times 100\%$$
$\% P_{loss} = 34,35\%$

Perhitungan hari 12

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{125,0 + 107,1 + 91,2}{3}$$
$I_{rata} = 107,77A$

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1,732 \times 387,5 \times 107,77$
$S = 671,15 \times 107,77$
$S = 72.329,84$ VA
$S = 72,33$ kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0,868 \times 0,675$
$R = 0,5859\ \Omega$
Sehingga :
$P_{loss} = 125,0^2 \times 0,5859 + 107,1^2 \times 0,5859 + 91,2^2 \times 0,5859$
$P_{loss} = 15.625 \times 0,5859 + 11.470,41 \times 0,5859 + 8.317,44 \times 0,5859$
$P_{loss} = 9.154,69 + 6.720,51 + 4.873,19$
$P_{loss} = 20.748,39W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$P_N = (27,8)^2 \times 0,5859$
$P_N = 452,81W$

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 20.748,39 + 452,81$
$P_{loss} = 21.201,2Watt$

$$P_{out} = S \times \cos \phi$$

$P_{out} = 72.329,84 \times 0,85$
$P_{out} = 61.480,36\ W$
$P_{out} = 61,48kW$
Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{21.201,2}{61.480,36} \times 100\%$$
$\% P_{loss} = 34,49\%$

Perhitungan hari 13

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{125,7 + 107,8 + 91,5}{3}$$
$I_{rata} = 108,33A$

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1,732 \times 388,2 \times 108,33$
$S = 672,36 \times 108,33$
$S = 72.836,76VA$
$S = 72,84\ kVA$

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0,868 \times 0,675$
$R = 0,5859\ \Omega$
Sehingga :
$P_{loss} = 125,7^2 \times 0,5859 + 107,8^2 \times 0,5859 + 91,5^2 \times 0,5859$
$P_{loss} = 15.800,49 \times 0,5859 + 11.620,84 \times 0,5859 + 8.372,25 \times 0,5859$
$P_{loss} = 9.257,51 + 6.808,65 + 4.905,30$
$P_{loss} = 20.971,46W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 \cdot R_N$$

$P_N = (28,1)^2 \times 0,5859$
$P_N = 462,63$ W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 20.971,46 + 462,63$
$P_{loss} = 21.434,1$Watt

$$P_{out} = S \times \cos \phi$$

$P_{out} = 72.836,76 \times 0,85$
$P_{out} = 61.911,25$ W
$P_{out} = 61,91$ kW
Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{21.434,1}{61.911,25} \times 100\%$$
$\% P_{loss} = 34,62\%$

Perhitungan hari 14

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{126,4 + 108,4 + 91,9}{3}$$
$I_{rata} = 108,90$A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1,732 \times 389,1 \times 108,90$
$S = 673,92 \times 108,90$
$S = 73.389,89$VA
$S = 73,39$ kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 \cdot R + I_S^2 \cdot R + I_T^2 \cdot R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0,868 \times 0,675$
$R = 0,5859\ \Omega$
Sehingga :
$P_{loss} = 126,4^2 \times 0,5859 + 108,4^2 \times 0,5859 + 91,9^2 \times 0,5859$
$P_{loss} = 15.976,96 \times 0,5859 + 11.750,56 \times 0,5859 + 8.445,61 \times 0,5859$
$P_{loss} = 9.360,90 + 6.884,65 + 4.948,28$

$P_{loss} = 21.193,84W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 \, . \, R_N$$

$P_N = (28,3)^2 \times 0,5859$

$P_N = 469,24$ W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$

$P_{loss} = 21.193,84 + 469,24$

$P_{loss} = 21.663,1$Watt

$$P_{out} = S \times \cos \phi$$

$P_{out} = 73.389,89 \times 0,85$

$P_{out} = 62.381,36$ W

$P_{out} = 62,38$ kW

Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{21.663,1}{62.381,36} \times 100\%$$

$\% P_{loss} = 34,73\%$

Perhitungan hari 15

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{127,0 + 109,0 + 92,0}{3}$$

$I_{rata} = 109,33$A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1,732 \times 390,4 \times 109,33$

$S = 676,17 \times 109,33$

$S = 73.925,67$VA

$S = 73,93$ kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 \, . \, R + I_S^2 \, . \, R + I_T^2 \, . \, R$$

Di mana :

$$R = r \times L$$

$R = r \times L$

$R = 0,868 \times 0,675$

$R = 0,5859\ \Omega$

Sehingga :

$P_{loss} = 127,0^2 \times 0,5859 + 109,0^2 \times 0,5859 + 92,0^2 \times 0,5859$

$P_{loss} = 16.129 \times 0,5859 + 11.881 \times 0,5859 + 8.464 \times 0,5859$

$P_{loss} = 9.449,98 + 6.961,08 + 4.959,06$
$P_{loss} = 21.370,12W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 \, . \, R_N$$

$P_N = (27,0)^2 \times 0,5859$
$P_N = 427,12$ W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 21.370,12 + 427,12$
$P_{loss} = 21.797,24$ Watt

$$P_{out} = S \times \cos \phi$$

$P_{out} = 73.925,67 \times 0,85$
$P_{out} = 62.836,82$ W
$P_{out} = 62,84$ kW
Persentase rugi–rugi daya :

$$\% \, P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% \, P_{loss} = \frac{21.797,24}{62.836,82} \times 100\%$$

$\% \, P_{loss} = 34,69\%$

Perhitungan hari 16

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{126,6 + 108,7 + 91,7}{3}$$

$I_{rata} = 109$ A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1,732 \times 389,5 \times 109$
$S = 674,61 \times 109$
$S = 73.532,93$VA
$S = 73,53$ kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 \, . \, R + I_S^2 \, . \, R + I_T^2 \, . \, R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0,868 \times 0,675$
$R = 0,5859 \, \Omega$
Sehingga :
$P_{loss} = 126,6^2 \times 0,5859 + 108,7^2 \times 0,5859 + 91,7^2 \times 0,5859$

$P_{loss} = 16.027{,}56 \times 0{,}5859 + 11.815{,}69 \times 0{,}5859 + 8.408{,}89 \times 0{,}5859$
$P_{loss} = 9.390{,}55 + 6.922{,}81 + 4.926{,}77$
$P_{loss} = 21.240{,}13W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 \cdot R_N$$

$P_N = (27{,}8)^2 \times 0{,}5859$
$P_N = 452{,}81$ W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 21.240{,}13 + 452{,}81$
$P_{loss} = 21.692{,}94$ Watt

$$P_{out} = S \times \cos \phi$$

$P_{out} = 73.532{,}93 \times 0{,}85$
$P_{out} = 62.502{,}99$ W
$P_{out} = 62{,}50$ kW

Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{21.692{,}94}{62.502{,}99} \times 100\%$$

$\% P_{loss} = 34{,}71\%$

Perhitungan hari 17

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{125{,}9 + 108{,}1 + 91{,}2}{3}$$

$I_{rata} = 108{,}40$ A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1{,}732 \times 388{,}6 \times 108{,}40$
$S = 673{,}06 \times 108{,}40$
$S = 72.959{,}18$VA
$S = 72{,}96$kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 \cdot R + I_S^2 \cdot R + I_T^2 \cdot R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0{,}868 \times 0{,}675$
$R = 0{,}5859\ \Omega$
Sehingga :

$P_{loss} = 125{,}9^2 \times 0{,}5859 + 108{,}1^2 \times 0{,}5859 + 91{,}2^2 \times 0{,}5859$
$P_{loss} = 15.850{,}81 \times 0{,}5859 + 11.685{,}61 \times 0{,}5859 + 8.317{,}44 \times 0{,}5859$
$P_{loss} = 9.286{,}99 + 6.849{,}60 + 4.873{,}19$
$P_{loss} = 21.009{,}8W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 \, . \, R_N$$

$P_N = (27{,}4)^2 \times 0{,}5859$
$P_N = 439{,}87$ W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 21.009{,}8 + 439{,}87$
$P_{loss} = 21.449{,}7$ Watt

$$P_{out} = S \times \cos \phi$$

$P_{out} = 72.959{,}18 \times 0{,}85$
$P_{out} = 62.015{,}30$ W
$P_{out} = 62{,}02$ kW

Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{21.449{,}7}{62.015{,}30} \times 100\%$$

$\% P_{loss} = 34{,}58\%$

Perhitungan hari 18

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{124{,}8 + 107{,}4 + 90{,}5}{3}$$

$I_{rata} = 107{,}57$ A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1{,}732 \times 387{,}3 \times 107{,}57$
$S = 670{,}80 \times 107{,}57$
$S = 72.157{,}96$VA
$S = 72{,}16$kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 \, . \, R + I_S^2 \, . \, R + I_T^2 \, . \, R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0{,}868 \times 0{,}675$
$R = 0{,}5859\ \Omega$

Sehingga :

$P_{loss} = 124{,}8^2 \times 0{,}5859 + 107{,}4^2 \times 0{,}5859 + 90{,}5^2 \times 0{,}5859$

$P_{loss} = 15.575{,}04 \times 0{,}5859 + 11.534{,}76 \times 0{,}5859 + 8.190{,}25 \times 0{,}5859$

$P_{loss} = 9.125{,}42 + 6.758{,}22 + 4.798{,}67$

$P_{loss} = 20.682{,}3W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 \,.\, R_N$$

$P_N = (27{,}1)^2 \times 0{,}5859$

$P_N = 430{,}29$ W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$

$P_{loss} = 20.682{,}3 + 430{,}29$

$P_{loss} = 21.112{,}6$ Watt

$$P_{out} = S \times \cos \phi$$

$P_{out} = 72.157{,}96 \times 0{,}85$

$P_{out} = 61.334{,}27$ W

$P_{out} = 61{,}33$ kW

Persentase rugi–rugi daya :

$$\%\, P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\%\, P_{loss} = \frac{21.112{,}6}{61.334{,}27} \times 100\%$$

$\%\, P_{loss} = 34{,}42\%$

Perhitungan hari 19

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{123{,}6 + 106{,}8 + 89{,}8}{3}$$

$I_{rata} = 106{,}73$ A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1{,}732 \times 386{,}8 \times 106{,}73$

$S = 669{,}94 \times 106{,}73$

$S = 71.520{,}67$VA

$S = 71{,}50$kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 \,.\, R + I_S^2 \,.\, R + I_T^2 \,.\, R$$

Di mana :

$$R = r \times L$$

$R = r \times L$

$R = 0{,}868 \times 0{,}675$

R = 0,5859 Ω
Sehingga :
$P_{loss} = 123{,}6^2 \times 0{,}5859 + 106{,}8^2 \times 0{,}5859 + 89{,}8^2 \times 0{,}5859$
$P_{loss} = 15.276{,}96 \times 0{,}5859 + 11.406{,}24 \times 0{,}5859 + 8.064{,}04 \times 0{,}5859$
$P_{loss} = 8.950{,}77 + 6.682{,}92 + 4.724{,}72$
$P_{loss} = 20.358{,}4W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 \, . \, R_N$$

$P_N = (26{,}7)^2 \times 0{,}5859$
$P_N = 417{,}68$ W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 20.358{,}4 + 417{,}68$
$P_{loss} = 20{,}776{,}1$ Watt

$$P_{out} = S \times \cos \phi$$

$P_{out} = 71.520{,}67 \times 0{,}85$
$P_{out} = 60.792.57$ W
$P_{out} = 60{,}79$ kW
Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{20{,}776{,}1}{60.792.57} \times 100\%$$
$\% P_{loss} = 34{,}18\%$

Perhitungan hari 20

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{122{,}7 + 106 + 89{,}2}{3}$$
$I_{rata} = 105{,}97$ A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1{,}732 \times 387{,}8 \times 105{,}97$
$S = 671{,}67 \times 105{,}97$
$S = 71.176{,}87$VA
$S = 71{,}18$kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 \, . \, R + I_S^2 \, . \, R + I_T^2 \, . \, R$$

Di mana :

$$R = r \times L$$

$R = r \times L$

$R = 0{,}868 \times 0{,}675$
$R = 0{,}5859\ \Omega$
Sehingga :
$P_{loss} = 122{,}7^2 \times 0{,}5859 + 106^2 \times 0{,}5859 + 89{,}2^2 \times 0{,}5859$
$P_{loss} = 15.055{,}29 \times 0{,}5859 + 11.236 \times 0{,}5859 + 7.956{,}64 \times 0{,}5859$
$P_{loss} = 8.820{,}89 + 6.583{,}17 + 4.661{,}80$
$P_{loss} = 20.065{,}86W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 \,.\, R_N$$

$P_N = (26{,}4)^2 \times 0{,}5859$
$P_N = 408{,}35$ W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 20.065{,}86 + 408{,}35$
$P_{loss} = 20.474{,}2$ Watt

$$P_{out} = S \times \cos \phi$$

$P_{out} = 71.176{,}87 \times 0{,}85$
$P_{out} = 60.500{,}34$ W
$P_{out} = 60{,}50$ kW
Persentase rugi–rugi daya :

$$\%\ P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\%\ P_{loss} = \frac{20.474{,}2}{60.500{,}34} \times 100\%$$
$\%\ P_{loss} = 33{,}84\%$

Perhitungan hari 21

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{121{,}5 + 105{,}4 + 88{,}6}{3}$$
$I_{rata} = 105{,}17$ A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1{,}732 \times 389 \times 105{,}17$
$S = 673{,}75 \times 105{,}17$
$S = 70.858{,}29$VA
$S = 70{,}86$kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 \,.\, R + I_S^2 \,.\, R + I_T^2 \,.\, R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0{,}868 \times 0{,}675$
$R = 0{,}5859\ \Omega$
Sehingga :
$P_{loss} = 121{,}5^2 \times 0{,}5859 + 105{,}4^2 \times 0{,}5859 + 88{,}6^2 \times 0{,}5859$
$P_{loss} = 14.762{,}25 \times 0{,}5859 + 11.109{,}16 \times 0{,}5859 + 7.849{,}96 \times 0{,}5859$
$P_{loss} = 8.649{,}20 + 6.508{,}86 + 4.599{,}29$
$P_{loss} = 19.757{,}4W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 \,.\, R_N$$

$P_N = (26)^2 \times 0{,}5859$
$P_N = 396{,}07\ W$

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 19.757{,}4 + 396{,}07$
$P_{loss} = 20.153{,}4\ Watt$

$$P_{out} = S \times \cos \phi$$

$P_{out} = 70.858{,}29 \times 0{,}85$
$P_{out} = 60.229{,}55\ W$
$P_{out} = 60{,}23\ kW$
Persentase rugi–rugi daya :

$$\%\ P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\%\ P_{loss} = \frac{20.153{,}4}{60.229{,}55} \times 100\%$$

$\%\ P_{loss} = 33{,}46\%$

Perhitungan hari 22

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{120{,}8 + 104{,}7 + 88}{3}$$

$I_{rata} = 104{,}50\ A$

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1{,}732 \times 390{,}1 \times 104{,}50$
$S = 675{,}65 \times 104{,}50$
$S = 70.605{,}43VA$
$S = 70{,}61kVA$

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 \,.\, R + I_S^2 \,.\, R + I_T^2 \,.\, R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0{,}868 \times 0{,}675$
$R = 0{,}5859\ \Omega$
Sehingga :
$P_{loss} = 120{,}8^2 \times 0{,}5859 + 104{,}7^2 \times 0{,}5859 + 88^2 \times 0{,}5859$
$P_{loss} = 14.592{,}64 \times 0{,}5859 + 10.962{,}09 \times 0{,}5859 + 7.744 \times 0{,}5859$
$P_{loss} = 8.549{,}83 + 6.422{,}67 + 4.537{,}21$
$P_{loss} = 19.509{,}7W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 \,.\, R_N$$

$P_N = (25{,}7)^2 \times 0{,}5859$
$P_N = 386{,}99$ W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 19.509{,}7 + 386{,}99$
$P_{loss} = 19.896{,}7$ Watt

$$P_{out} = S \times \cos \phi$$

$P_{out} = 70.605{,}43 \times 0{,}85$
$P_{out} = 60.014{,}62$ W
$P_{out} = 60{,}01$ kW
Persentase rugi–rugi daya :

$$\%\ P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\%\ P_{loss} = \frac{19.896{,}7}{60.014{,}62} \times 100\%$$

$\%\ P_{loss} = 33{,}15\%$

Perhitungan hari 23

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{119{,}6 + 103{,}8 + 87{,}2}{3}$$

$I_{rata} = 103{,}53$ A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1{,}732 \times 389{,}4 \times 103{,}53$
$S = 674{,}44 \times 103{,}53$
$S = 69.824{,}77$VA
$S = 69{,}82$kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 \,.\, R + I_S^2 \,.\, R + I_T^2 \,.\, R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0{,}868 \times 0{,}675$
$R = 0{,}5859\ \Omega$
Sehingga :
$P_{loss} = 119{,}6^2 \times 0{,}5859 + 103{,}8^2 \times 0{,}5859 + 87{,}2^2 \times 0{,}5859$
$P_{loss} = 14.304{,}16 \times 0{,}5859 + 10.774{,}44 \times 0{,}5859 + 7.603{,}84 \times 0{,}5859$
$P_{loss} = 8.380{,}81 + 6.312{,}74 + 4.455{,}09$
$P_{loss} = 19.148{,}6W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 \,.\, R_N$$

$P_N = (25{,}3)^2 \times 0{,}5859$
$P_N = 375{,}03$ W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 19.148{,}6 + 375{,}03$
$P_{loss} = 19.523{,}6$Watt

$$P_{out} = S \times \cos\phi$$

$P_{out} = 69.824{,}77 \times 0{,}85$
$P_{out} = 59.351{,}05$ W
$P_{out} = 59{,}35$ kW
Persentase rugi–rugi daya :

$$\%\ P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\%\ P_{loss} = \frac{19.523{,}6}{59.351{,}05} \times 100\%$$
$\%\ P_{loss} = 32{,}89\%$

Perhitungan hari 24

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{118{,}7 + 102{,}9 + 86{,}5}{3}$$
$I_{rata} = 102{,}70$ A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1{,}732 \times 388{,}5 \times 102{,}70$
$S = 672{,}88 \times 102{,}70$
$S = 69.104{,}78$VA
$S = 69{,}10$kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0{,}868 \times 0{,}675$
$R = 0{,}5859\ \Omega$
Sehingga :
$P_{loss} = 118{,}7^2 \times 0{,}5859 + 102{,}9^2 \times 0{,}5859 + 86{,}5^2 \times 0{,}5859$
$P_{loss} = 14.089{,}69 \times 0{,}5859 + 10.588{,}41 \times 0{,}5859 + 7.482{,}25 \times 0{,}5859$
$P_{loss} = 8.255{,}15 + 6.203{,}75 + 4.383{,}85$
$P_{loss} = 18.842{,}8W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$P_N = (25)^2 \times 0{,}5859$
$P_N = 366{,}19$ W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 18.842{,}8 + 366{,}19$
$P_{loss} = 19.208{,}9$Watt

$$P_{out} = S \times \cos \phi$$

$P_{out} = 69.104{,}78 \times 0{,}85$
$P_{out} = 58.739{,}06$ W
$P_{out} = 58{,}74$ kW
Persentase rugi–rugi daya :

$$\%\ P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\%\ P_{loss} = \frac{19.208{,}9}{58.739{,}06} \times 100\%$$

$\%\ P_{loss} = 32{,}70\%$

Perhitungan hari 25

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{127{,}4 + 109{,}5 + 92{,}5}{3}$$

$I_{rata} = 109{,}8$ A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1{,}732 \times 391{,}2 \times 109{,}8$
$S = 677{,}56 \times 109{,}8$
$S = 74.396{,}09$VA
$S = 74{,}40$ kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0{,}868 \times 0{,}675$
$R = 0{,}5859\ \Omega$
Sehingga :
$P_{loss} = 127{,}4^2 \times 0{,}5859 + 109{,}5^2 \times 0{,}5859 + 92{,}5^2 \times 0{,}5859$
$P_{loss} = 16.230{,}76 \times 0{,}5859 + 11.990{,}25 \times 0{,}5859 + 8.556{,}25 \times 0{,}5859$
$P_{loss} = 9.509{,}6 + 7.025{,}1 + 5.013{,}1$
$P_{loss} = 21.547{,}8\ W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$P_N = (28{,}2)^2 \times 0{,}5859$
$P_N = 465{,}93$ W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 21.547{,}8 + 465{,}93$
$P_{loss} = 22.013{,}73$Watt

$$P_{out} = S \times \cos \phi$$

$P_{out} = 74.396{,}09 \times 0{,}85$
$P_{out} = 63.236{,}68$ W
$P_{out} = 63{,}24$ kW
Persentase rugi–rugi daya :

$$\%\ P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\%\ P_{loss} = \frac{22.013{,}73}{63.236{,}68} \times 100\%$$
$\%\ P_{loss} = 34{,}81\ \%$

Perhitungan hari 26

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{116{,}4 + 100{,}5 + 85}{3}$$
$I_{rata} = 100{,}63$ A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1{,}732 \times 386{,}4 \times 100{,}63$
$S = 669{,}24 \times 100{,}63$
$S = 67.345{,}62$VA
$S = 67{,}35$ kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0{,}868 \times 0{,}675$
$R = 0{,}5859\ \Omega$
Sehingga :
$P_{loss} = 116{,}4^2 \times 0{,}5859 + 100{,}5^2 \times 0{,}5859 + 85^2 \times 0{,}5859$
$P_{loss} = 13.548{,}96 \times 0{,}5859 + 10.100{,}25 \times 0{,}5859 + 7.225 \times 0{,}5859$
$P_{loss} = 7.938{,}34 + 5.917{,}74 + 4.233{,}18$
$P_{loss} = 18.089{,}2W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$P_N = (24{,}5)^2 \times 0{,}5859$
$P_N = 351{,}69$ W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 18.089{,}2 + 351{,}69$
$P_{loss} = 18.440{,}9$ Watt

$$P_{out} = S \times \cos \phi$$

$P_{out} = 67.345{,}62 \times 0{,}85$
$P_{out} = 57.243{,}78$ W
$P_{out} = 57{,}25$ kW
Persentase rugi–rugi daya :

$$\%\ P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\%\ P_{loss} = \frac{18.440{,}9}{57.243{,}78} \times 100\%$$

$\%\ P_{loss} = 32{,}21\ \%$

Perhitungan hari 27

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{118{,}8 + 102{,}1 + 86{,}4}{3}$$

$I_{rata} = 102{,}43$ A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1{,}732 \times 387{,}6 \times 102{,}43$
$S = 671{,}32 \times 102{,}43$

$S = 68.763{,}31VA$
$S = 68{,}76\ kVA$

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 \,.\, R + I_S^2 \,.\, R + I_T^2 \,.\, R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0{,}868 \times 0{,}675$
$R = 0{,}5859\ \Omega$
Sehingga :
$P_{loss} = 118{,}8^2 \times 0{,}5859 + 102{,}1^2 \times 0{,}5859 + 86{,}4^2 \times 0{,}5859$
$P_{loss} = 14.113{,}44 \times 0{,}5859 + 10.424{,}41 \times 0{,}5859 + 7.464{,}96 \times 0{,}5859$
$P_{loss} = 8.269{,}06 + 6.107{,}66 + 4.373{,}72$
$P_{loss} = 18.750{,}45W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 \,.\, R_N$$

$P_N = (25{,}1)^2 \times 0{,}5859$
$P_N = 369{,}12\ W$

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 18.750{,}45 + 369{,}12$
$P_{loss} = 19.119{,}6\ Watt$

$$P_{out} = S \times \cos\phi$$

$P_{out} = 68.763{,}31 \times 0{,}85$
$P_{out} = 58.448{,}81\ W$
$P_{out} = 58{,}45\ kW$
Persentase rugi–rugi daya :

$$\%\ P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\%\ P_{loss} = \frac{19.119{,}6}{58.448{,}81} \times 100\%$$

$\%\ P_{loss} = 32{,}71\ \%$

Perhitungan hari 28

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{121{,}4 + 105{,}6 + 88{,}9}{3}$$

$I_{rata} = 105{,}30\ A$

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1{,}732 \times 388{,}8 \times 105{,}30$
$S = 673{,}40 \times 105{,}30$
$S = 70.909{,}02VA$
$S = 70{,}91$ kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0{,}868 \times 0{,}675$
$R = 0{,}5859\ \Omega$
Sehingga :
$P_{loss} = 121{,}4^2 \times 0{,}5859 + 105{,}6^2 \times 0{,}5859 + 88{,}9^2 \times 0{,}5859$
$P_{loss} = 14.737{,}96 \times 0{,}5859 + 11.151{,}36 \times 0{,}5859 + 7.903{,}21 \times 0{,}5859$
$P_{loss} = 8.634{,}97 + 6.533{,}58 + 4.630{,}49$
$P_{loss} = 19.799{,}04W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$P_N = (26{,}2)^2 \times 0{,}5859$
$P_N = 402{,}19$ W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 19.799{,}04 + 402{,}19$
$P_{loss} = 20.201{,}23$ Watt

$$P_{out} = S \times \cos \phi$$

$P_{out} = 70.909{,}02 \times 0{,}85$
$P_{out} = 60.272{,}68$ W
$P_{out} = 60{,}27$ kW
Persentase rugi–rugi daya :

$$\% P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\% P_{loss} = \frac{20.201{,}23}{60.272{,}68} \times 100\%$$
$\% P_{loss} = 33{,}52\ \%$

Perhitungan hari 29

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{123{,}5 + 107{,}4 + 90{,}5}{3}$$
$I_{rata} = 107{,}13$ A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1{,}732 \times 389{,}7 \times 107{,}13$
$S = 674{,}96 \times 107{,}13$
$S = 72.308{,}46VA$
$S = 72.31\ kVA$

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$R = r \times L$
$R = 0{,}868 \times 0{,}675$
$R = 0{,}5859\ \Omega$
Sehingga :
$P_{loss} = 123{,}5^2 \times 0{,}5859 + 107{,}4^2 \times 0{,}5859 + 90{,}5^2 \times 0{,}5859$
$P_{loss} = 15.252{,}25 \times 0{,}5859 + 11.534{,}76 \times 0{,}5859 + 8.190{,}25 \times 0{,}5859$
$P_{loss} = 8.936{,}29 + 6.758{,}22 + 4.798{,}67$
$P_{loss} = 20.493{,}2W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$P_N = (26{,}9)^2 \times 0{,}5859$
$P_N = 423{,}96\ W$

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$
$P_{loss} = 20.493{,}2 + 423{,}96$
$P_{loss} = 20.917{,}14\ Watt$

$$P_{out} = S \times \cos \phi$$

$P_{out} = 72.308{,}46 \times 0{,}85$
$P_{out} = 61.462{,}20\ W$
$P_{out} = 61{,}46\ kW$
Persentase rugi–rugi daya :

$$\%\ P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\%\ P_{loss} = \frac{20.917{,}14}{61.462{,}20} \times 100\%$$

$\%\ P_{loss} = 34{,}03\ \%$

Perhitungan hari 30

1. Perhitungan Arus Rata-Rata

$$I_{rata} = \frac{I_R + I_S + I_T}{3}$$

$$I_{rata} = \frac{125{,}8 + 108{,}8 + 91{,}8}{3}$$

$I_{rata} = 108{,}80$ A

2. Perhitungan Daya Semu Transformator

$$S = \sqrt{3} \times V_{LL} \times I_{rata}$$

$S = 1{,}732 \times 390{,}6 \times 108{,}80$

$S = 676{,}52 \times 108{,}80$

$S = 73.605{,}38$ VA

$S = 73{,}61$ kVA

3. Perhitungan Rugi-Rugi Daya Penghantar

$$P_{penghantar} = I_R^2 . R + I_S^2 . R + I_T^2 . R$$

Di mana :

$$R = r \times L$$

$R = r \times L$

$R = 0{,}868 \times 0{,}675$

$R = 0{,}5859\ \Omega$

Sehingga :

$P_{loss} = 125{,}8^2 \times 0{,}5859 + 108{,}8^2 \times 0{,}5859 + 91{,}8^2 \times 0{,}5859$

$P_{loss} = 15.825{,}64 \times 0{,}5859 + 11.837{,}44 \times 0{,}5859 + 8.427{,}24 \times 0{,}5859$

$P_{loss} = 9.272{,}24 + 6.935{,}56 + 4.937{,}52$

$P_{loss} = 21.145{,}32W$

4. Perhitungan Rugi-Rugi Daya Akibat Arus Netral

$$P_N = I_N^2 . R_N$$

$P_N = (27{,}6)^2 \times 0{,}5859$

$P_N = 446{,}32$ W

5. Persentase Rugi–Rugi Daya Akibat Adanya Arus Netral

$$P_{loss} = P_{penghantar} + P_N$$

$P_{loss} = P_{penghantar} + P_N$

$P_{loss} = 21.145{,}32 + 446{,}32$

$P_{loss} = 21.591{,}6$ Watt

$$P_{out} = S \times \cos \phi$$

$P_{out} = 73.605{,}38 \times 0{,}85$

$P_{out} = 62.564{,}57$ W

$P_{out} = 62{,}56$ kW

Persentase rugi–rugi daya :

$$\%\ P_{loss} = \frac{p_{loss}}{P_{out}} \times 100\%$$

$$\%\ P_{loss} = \frac{21.591{,}6}{62.564{,}57} \times 100\%$$

$\%\ P_{loss} = 34{,}51\ \%$

Tabel 4.6 Rekapitulasi Perhitungan Rugi - Rugi Daya

Irata	S		Ppenghantar			PN	Ploss	Pout		%Ploss
			R	Ploss	kVA			W	KW	
97,23	65578,13	65,58	0,5859	16883,44	16,883	340,297	17223,74	55741,41	55,74	30,90
98,47	66290,56	66,29	0,5859	17320,67	17,321	354,563	17675,23	56346,97	56,35	31,37
99,80	67015,34	67,02	0,5859	17787,19	17,787	366,188	18153,37	56963,04	56,96	31,87
100,90	67526,80	67,53	0,5859	18178,58	18,179	375,029	18553,61	57397,78	57,40	32,32
102,03	68515,02	68,52	0,5859	18590,10	18,590	389,998	18980,10	58237,76	58,24	32,59
103,20	69405,67	69,41	0,5859	19023,81	19,024	402,185	19425,99	58994,82	58,99	32,93
104,20	70294,78	70,29	0,5859	19390,54	19,391	411,448	19801,98	59750,56	59,75	33,14
104,97	70921,06	70,92	0,5859	19676,29	19,676	420,817	20097,10	60282,90	60,28	33,34
105,70	71160,24	71,16	0,5859	19953,37	19,953	427,121	20380,49	60486,21	60,49	33,69
106,33	71420,87	71,42	0,5859	20193,20	20,193	436,665	20629,86	60707,74	60,71	33,98
107,17	71794,98	71,79	0,5859	20513,84	20,514	446,315	20960,16	61025,73	61,03	34,35
107,77	72327,60	72,33	0,5859	20748,39	20,748	452,807	21201,20	61478,46	61,48	34,49
108,33	72839,26	72,84	0,5859	20971,46	20,971	462,632	21434,09	61913,37	61,91	34,62
108,90	73390,02	73,39	0,5859	21193,84	21,194	469,241	21663,08	62381,52	62,38	34,73
109,33	73928,23	73,93	0,5859	21370,12	21,370	427,121	21797,24	62838,99	62,84	34,69
109,00	73532,93	73,53	0,5859	21240,13	21,240	452,807	21692,94	62502,99	62,50	34,71
108,40	72959,18	72,96	0,5859	21006,78	21,007	439,870	21446,65	62015,31	62,02	34,58
107,57	72156,11	72,16	0,5859	20682,30	20,682	430,291	21112,59	61332,69	61,33	34,42
106,73	71504,67	71,50	0,5859	20358,41	20,358	417,682	20776,09	60778,97	60,78	34,18
105,97	71174,59	71,17	0,5859	20065,86	20,066	408,349	20474,21	60498,40	60,50	33,84
105,17	70855,83	70,86	0,5859	19757,35	19,757	396,068	20153,42	60227,46	60,23	33,46
104,50	70605,76	70,61	0,5859	19509,73	19,510	386,981	19896,71	60014,90	60,01	33,15
103,53	69827,10	69,83	0,5859	19148,64	19,149	375,029	19523,67	59353,04	59,35	32,89
102,70	69104,98	69,10	0,5859	18842,75	18,843	366,188	19208,94	58739,23	58,74	32,70
109,80	**74395,91**	**74,40**	**0,5859**	**21547,80**	**21,548**	**465,931**	**22013,73**	**63236,53**	**63,24**	**34,81**
100,63	67348,34	67,35	0,5859	18089,20	18,089	351,686	18440,89	57246,08	57,25	32,21
102,43	68765,87	68,77	0,5859	18750,45	18,750	369,123	19119,57	58450,99	58,45	32,71
105,30	70909,19	70,91	0,5859	19799,04	19,799	402,185	20201,23	60272,81	60,27	33,52
107,13	72310,76	72,31	0,5859	20493,18	20,493	423,963	20917,14	61464,14	61,46	34,03
108,80	73605,29	73,61	0,5859	21145,32	21,145	446,315	21591,63	62564,50	62,56	34,51

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