TD 05

Exercise 01

A single-phase control and signaling transformer has the following characteristics: 230 V / 24 V, 50 Hz, 630 VA.

1. The total losses at rated load are 54.8 W. Calculate the rated efficiency of the transformer for $\cos \varphi_2 = 1$ and $\cos \varphi_2 = 0.3$.
2. Calculate the rated current at the secondary, I_{2N}.
3. The no-load losses (iron losses) are 32.4 W. Deduce the Joule losses at rated load. Deduce R_s, the winding resistance referred to the secondary.

Exercise 02

A single-phase transformer has the following nameplate data:

- $S = 2200$ VA,
- $\eta = 0.95$,
- Primary voltage $V_1n = 220$ V,
- Secondary voltage $V_2n = 127$ V.

1. Calculate the rated primary current I_1n.
2. Calculate the rated secondary current I_2n.
3. The efficiency is specified for a load drawing rated current at rated secondary voltage with a power factor $\cos \varphi = 0.8$ lagging. Calculate the value of the losses in the transformer under these conditions.

Exercise 3

A single-phase transformer has the following characteristics:

- 230 / 24 V – 50 Hz
- $S_n = 160$ VA

This transformer supplies a control circuit that absorbs a power of 80 W with a $\cos \varphi = 0.75$.

1. Calculate the transformation ratio (m).
2. Knowing that the primary winding has 700 turns, calculate the number of turns of the secondary winding.
3. Calculate the rated current in the secondary and then in the primary.
4. Calculate the current delivered by the secondary of the transformer when supplying the load.