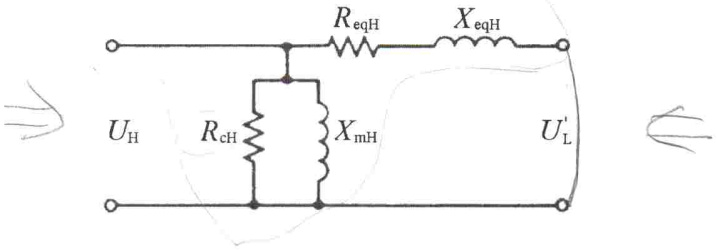
Exercises

3) (8p) The voltage ratio of a three-phase transformer is 3800/380 and the connection of the windings is Y-Y. Tests are performed on the transformer and the following results are obtained:

- Open circuit test (high-voltage side open, measurements from low-voltage side): $U_{o.c.}$= 380 V, $I_{o.c.}$ = 2.5 A, $P_{o.c.}$ = 300W.
- Short circuit test (low-voltage side shorted, measurements from high-voltage side): $U_{s.c.}$= 260 V, $I_{s.c.}$ = 4.55 A, $P_{s.c.}$ = 645 W.

Determine the parameters of the equivalent circuit shown in the figure referred on the high-voltage side.



4) (8p) A four-pole, squirrel-cage induction motor has a frequency of f = 60 Hz and a nominal speed n = 1710 rpm. The starting torque of the motor is T_{start} = 1.8 p.u. Determine the maximum torque the motor can develop and the speed at which the motor develops the maximum torque. Accept that the full load (nominal) torque of the motor is T_{fl} = 1 p.u..

5) (8p) A three-phase synchronous generator has the following nominal data: S = 2 MVA, U_l = 11 kV, n_s = 1800 rpm, R_a = 1.5 Ω, X_s = 15 Ω. The stator winding is connected into Y-connection. The generator is made to deliver the rated current at power factor cosφ = 0.8 lagging.

a) Determine the excitation voltage E_f at the rated condition.

b) Determine the maximum power P_{max} the generator can supply if the field current is kept constant.