

系所組別： 電機工程學系丙組

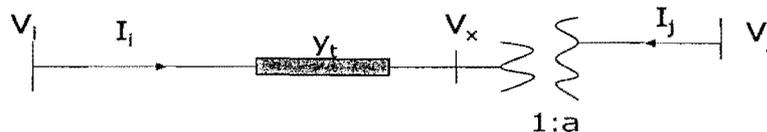
考試科目： 電力工程

考試日期： 0226 · 節次： 2

1. (a) (10 %) Please explain the reason for shaded-pole motors used only in low-power applications.
- (b) (10 %) Based on the double-revolving field theory, please briefly describe the purpose of auxiliary winding installed in a single-phase induction motor.

2. (a) (15 %) Why are cycloconverters favored in low-speed and large horsepower scenarios?
- (b) (20 %) Through the comparisons with other thyristors, please list one major advantage of Gate-Turn-Off (GTO) thyristors. Please also illuminate the importance of the snubber circuit that is often concerned during this circuit design.

3. Consider a transformer with admittance y_t with the off nominal turn ratio $1:a$ as shown in the figure below:



- (a) (8%) derive the current I_i and I_j in terms of V_i , V_j , y_t , and a .
- (b) (7%) plot the equivalent π model according to the relations you derive from part (a), please also label the **Tap side** and **Non-tap side** in the derived equivalent circuit.

4. Consider a synchronous generator with the following direct axis parameters: Stator leakage reactance X_L , armature reaction reactance X_{ad} , rotor field winding reactance X_f , rotor field winding resistance R_f , rotor damper winding reactance X_{kd} , rotor damper winding resistance R_k . Please use the aforementioned parameters to do the following.
 - (a) (8%) ignore the winding resistance, plot the direct axis transient equivalent circuit and derive the transient reactance X'_d
 - (b) (8%) ignore the winding resistance, plot the direct axis subtransient equivalent circuit and derive the subtransient reactance X''_d .
 - (c) (7%) derive the direct axis short circuit transient time constant τ'_d .
 - (d) (7%) derive the direct axis short circuit subtransient time constant τ''_d .