

- 一、(8%) 申論題 Answer the following two questions about transformers.
- (一)、Describe the harmonic problems of a Y-Y connected three-phase transformer. (4%)
 - (二)、What is Y-Y with tertiary Δ transformer? (4%)
- 二、(22%) 計算題 A 1ϕ , 200kVA, 2000V/200V, 60Hz transformer gave the following test data:
OCT: 200V, 20A, 200W; SCT: 100V, 100A, 800W.
- (一)、(8%)
 1. Find the efficiency at full load, $\cos\theta = 0.8$. (4%)
 2. Find the absolute maximum efficiency. (4%)
 - (二)、(8%)
 1. Connect this conventional transformer as an auto-transformer with 2000/2200V (draw the circuit). (3%)
 2. Find the VA rating of auto-transformer. (2.5%)
 3. Find the efficiency at full load, $\cos\theta = 0.8$. (2.5%)
 - (三)、Three these single-phase transformers are connected as a delta-delta connected three-phase transformer bank, find its primary and secondary three-phase line-to-line voltages, and its three-phase VA rating. (6%)
- 三、(15%) 計算題 A single phase full bridge inverter acts as the interface between the PV generation system and the grid voltage of 220 Vac (RMS), 60 Hz. A filter inductor of 2mH is on the AC side of the inverter to smooth the output current. The PV generation system can produce 5kW at its maximum. Assuming the inverter has no operational losses, what is the minimum DC bus voltage of the inverter that allows linear modulation under all conditions?
- 四、(15%) 計算題 As shown in Fig. 1, the source voltages are positive sequence sets and all impedances are equal to Z. Using an appropriate interconnection of sequence network, please find I^f (in terms of Z) and V_{ag} .

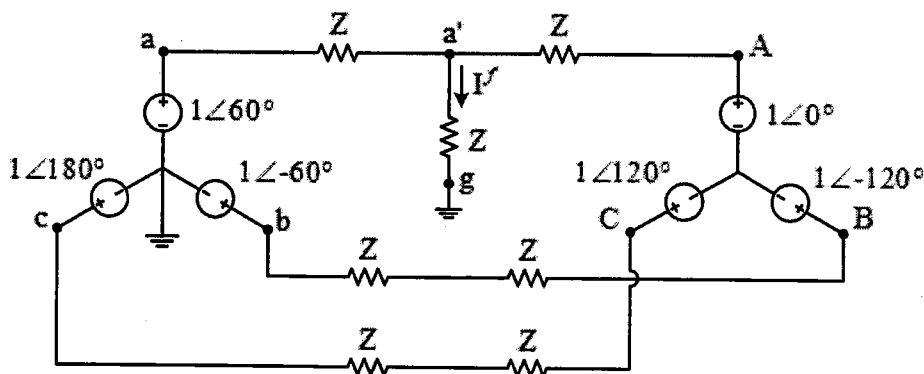


Fig. 1

注意：背面有試題

五、(24%) 計算題 Consider the three-phase AC power system shown in Fig. 2. Bus 1 is the reference bus. The admittance of each transmission line is $Y_{ii}=-9.90$ p.u. and $Y_{ij}=5$ p.u., for $i \neq j$, $i, j=1, 2, 3$. The solution of the power flow is shown in this figure.

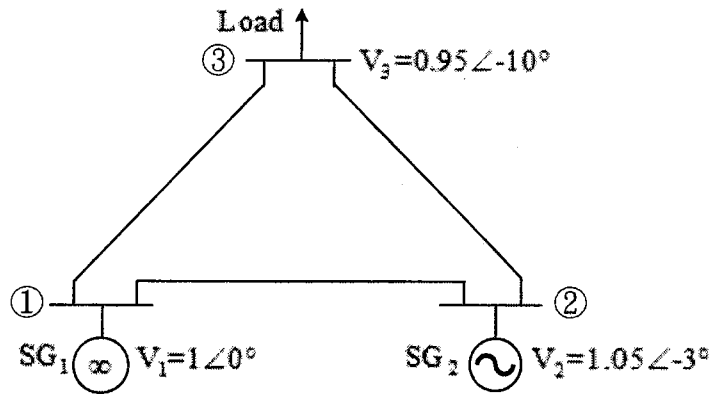


Fig. 2

- (一)、 Find the admittance matrix. (5%)
- (二)、 Illustrate how to find the power solution. (9%)
- (三)、 Determine the line from Bus 1 to Bus 2. (5%)
- (四)、 Find the complex power provided by SG2. (5%)

六、(16%) 計算題 A 60-Hz three-phase synchronous generator having inertia constant $H=5$ MJ/MVA and a direct axis transient reactance $x'_d=0.3$ p.u. is connected to an infinite bus through a purely reactive circuit as shown in Fig. 3. Reactances are marked on the diagram in a common system base. The generator is delivering real power $P_e=0.8$ p.u. and $Q=0.074$ p.u. to the infinite bus at a voltage of $V=1$ p.u.

- (一)、 A temporary three-phase fault occurs at the sending end of the line at point F. When the fault is cleared, both lines are intact. Determine the critical clearing angle δ_1 . (7%)
- (二)、 A three-phase fault occurs at the middle of one of the lines, the fault is cleared, and the fault line is isolated. Determine the critical clearing angle δ_2 . (7%)
- (三)、 Which one is larger between δ_1 and δ_2 ? (2%)

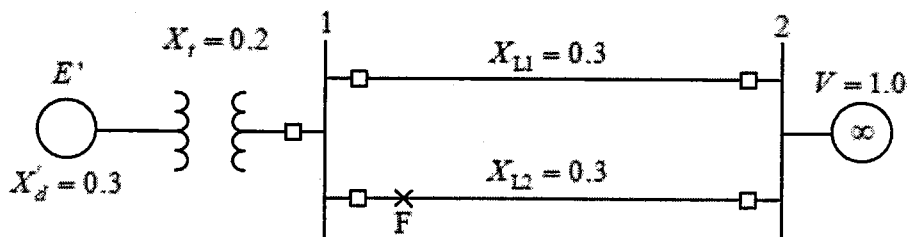


Fig. 3