

1. (a) List the tests required to determine synchronous impedance of an alternator.
(b) What may be determined from each test?
(20%)
2. A three-phase Y-connected synchronous motor has negligible armature resistance and a synchronous reactance of $12\ \Omega/\text{phase}$. The motor takes $12,000\ \text{kW}$ at a line voltage of $13,200\ \text{V}$. If the field current is adjusted so that the excitation voltage is $9,000\ \text{V}/\text{phase}$:
- (a) What is the torque angle?
(b) At what power factor is the motor operating?
(c) What is its armature current?
(15%)
3. Calculate the relative values of the starting torque and the starting current of a three-phase squirrel-cage induction motor when started by
- (a) rated voltage,
(b) a star-delta starter, and
(c) a three-phase autotransformer having 60% voltage taps.
(15%)

(背面仍有題目,請繼續作答)

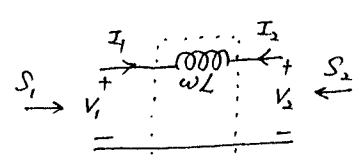
4. 如右圖所示, 若 $|V_1| = |V_2|$.

(a) 試証 $S_2 = -S_1^*$ (8%)

(b) 若已知 $\omega L = 10 \Omega$.

$|I_1| = 10 A$, 則 $|Q_1| = ?$

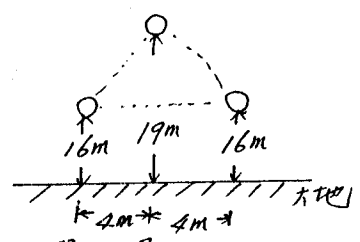
($S_1 = P_1 + jQ_1$) (7%)



題 4 圖形

5. 一單回路三相換位線路, 如右圖所示, 導線之直徑為 20mm, 長 200 km, 線間電壓 161kV, 頻率 60Hz, 試求 (1) 不計大地效應,

(2) 考慮大地影響下每線至中性點之電容及充電電流. (20%)



題 5 圖形

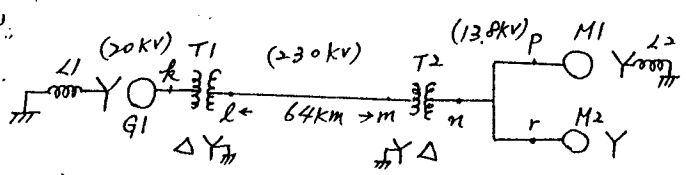
6. 如右圖

已知 $G_1: 300MVA, 20kV, z_0 = 0.05 pu$.

$M_1: 200MVA, 13.8kV, z_0 = 0.05 pu$.

$M_2: 100MVA, 13.8kV, z_0 = 0.05 pu$.

G_1 及 M_1 均採用 Y 接,



中性點經由 0.4Ω (L_1, L_2) 之電感接地; M_2 採用 Y 接法, 但中性點不接地.

T_1 為 $20kV/230kV, 350MVA$, 漏電抗 $0.1 pu$. ΔY 接, 二次側中性點直接接地.

T_2 為 $230kV/13.8kV, 300MVA$, 漏電抗 $0.1 pu$. $Y \Delta$ 接, 一次側中性點直接接地.

傳輸線 $l-m$ 間共 64km, 零序電抗為 $1.5 \Omega/km$.

試劃出此電路之零序網路圖 (15%)
(zero-sequence network)