1. What is the position of the armature-reaction flux relative to the main-field flux for the following balanced-load conditions: (a) armature phase current is in phase with armature phase induced voltage; (b) armature phase current lags armature phase induced voltage; (c) armature phase current leads armature phase induced voltage? (15%)

2. A 30-kVA, 2.4-kV/0.6-kV transformer is connected as a step-up autotransformer from a 2.4 kV supply. Calculate the currents in each part of the transformer and the load rating. Neglect losses. (15%)

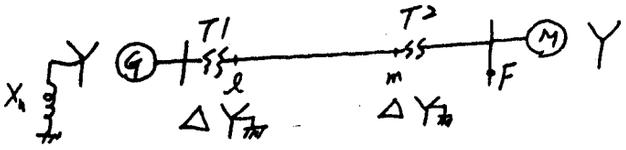
3. A 1000-kVA 4600-V three-phase 60-Hz Y-connected ac generator has a no-load voltage of 8350. The generator is operated at rated volt-amperes and 0.75 power factor lagging and rated voltage. Calculate
   (a) the synchronous reactance (neglect armature resistance),
   (b) the voltage regulation,
   (c) the torque angle,
   (d) the developed or air gap power, and
   (e) the new voltage and kVA rating if the armature winding is connected in delta. (20%)

(背面仍有題目,請繼續作答)

4. 在任何線性、被動、對稱之四端網路中，對ABCD參數而言，試証
(a) $AD-BC=1$. (8%)
(b) $A=D$ (8%)

5. (a)在負載潮流(power flow)方程式求解中，一般設定了幾種型式之匯流排(Bus type)，意義為何？ (5%)
(b) 求經濟調度中，用到 B 參數(B loss coefficients)，其定義為何？ (5%)

6. 如下圖，求(a)正相序、負相序及零相序網路圖。 (16%)
(b)若F發生單線接地故障，則故障電流多少？ (8%)
(以10MVA, 13.8KV 為基值(Base)之標么表示)



$X_n = 2\Omega$
G: 13.8KV, 50 MVA, $X=X_2=0.25\Omega$, $X_0=0.2\Omega$
T_1: 13.8KV/138KV, 25MVA, $X_1=X_2=X_0=25\Omega$
T_2: 138KV/13.8KV, 10MVA, $X_1=X_2=X_0=150\Omega$
線 lm: $X_1=X_2=X_0=200\Omega$
M: 13.8KV, 5MVA, $X_1=X_2=1.2\Omega$, $X_0=0.4\Omega$