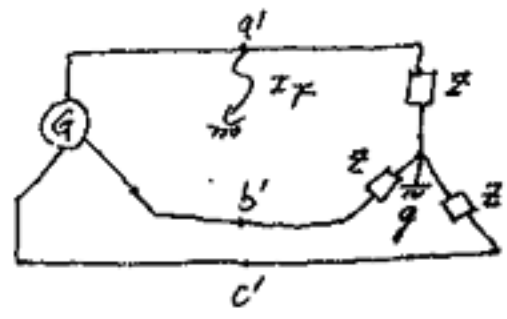
1. 解釋名詞 (15%)
   (1) MHD發電
   (2) skin effect
   (3) Differential Relay (87)
   (4) Pilot wire Relay (85)
   (5) Plant operating factor

2. 如右圖，已知負載阻抗 $Z = j0.1$ (15%)
   發電机阻抗 $Z^+ = j1.0$
   $Z^- = j0.1$
   $Z^0 = j0.005$



   若發电机中性点不接地，且故障前 $V_{a'g} = 1\angle 0°$，求故障电流 I_F

3. 一長程傳輸線，其終端电路為定制特性阻抗 Z_L，請求(a) 驅動点阻抗 $\frac{V_1}{I_1}$ (b) 电压增益 $\frac{|V_2|}{|V_1|}$ (c) 电流增益 $\frac{|I_2|}{|I_1|}$
   (d) 複功率增益 $\frac{-S_{21}}{S_{12}}$ (e) 實功率增益 $\frac{-P_{21}}{P_{12}}$.
   若該傳輸線無損失，則上述(b)(c)(d)(e)之解為何？ (20%)

4. (20%) a. What are eddy current losses? What can be done to minimize eddy current losses in a core?
   b. What is armature reaction? How does it affect the operation of a dc machine?
   c. What is the difference between a synchronous motor and a synchronous generator?
   d. Explain the meaning of the "short-circuit ratio" of a synchronous generator?

5. (20%) A 208-V six-pole Y-connected 25-hp design class B induction motor is tested in the laboratory, which the following results:
   No load : 208 V, 20 A, 1200 W, 60 Hz
   Locked rotor : 26 V, 60 A, 2160 W, 15 Hz
   DC test : 16 V, 64A
   a. Find the equivalent circuit of this motor.
   b. For this motor with a slip of 0.05, find the line current I_L and the stator copper losses P_{SCL}.
   (Hint: Class B induction motor $X_1 = 0.4X_{LR}$, $X_2 = 0.6X_{LR}$)

6. (10%) A 60-Hz synchronous motor is coupled to, and drives, a 50-Hz synchronous generator.
   a. How many poles does each machine have?
   b. At what speed does the motor-generator set operate?