

# 國立臺北科技大學九十六學年度碩士班招生考試

系所組別：1611 電機工程系碩士班甲組

## 第一節 電力系統 試題

第一頁 共一頁

### 注意事項：

1. 本試題共 9 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

一、Answer the following questions: (60%)

1. How to control the reactive power and real power outputs from the generator and transformer? (12%)
2. What is the voltage regulation of a transmission line? What situation will lead to negative voltage regulation? (12%)
3. How to obtain the symmetrical components from three unbalanced phasors? Describe the advantages of symmetrical components for unbalance fault analysis.(12%)
4. What is the sequence network? Draw the zero-sequence equivalent circuit of a three-phase transformer bank with  $\Delta$ - $\Delta$  winding connection. (12%)
5. Derive the power-angle equation of a transformer with the primary voltage  $\mathbf{E}$  and the secondary voltage  $\mathbf{V}$ , and leakage reactance  $j\mathbf{X}$ . ( Assume that the power angle is  $\delta$  and neglecting the loss and excitation current of transformer.) (12%)

二、Consider a three-phase transmission line with a total series impedance of  $25+j100\Omega$  and a shunt impedance of  $-j2k\Omega$ , and the receiving-end line-to-line voltage 161kV (rms). Solve the following problems: (40%)

1. Find the A,B,C,D parameters (transmission parameters) by the  $\pi$ -equivalent circuit model ( nominal-  $\pi$  approximation model). (10%)
2. Find the line-to-line voltage at the sending-end when it delivers 20MW with 0.8 power factor lagging at receiving-end by using the parameters obtained above.(10%)
3. Calculate the voltage regulation with respect to full load 25 MW with 0.8 power factor lagging and line-to-line voltage 161kV (rms) at the sending-end.(10%)
4. If the voltage magnitudes of receiving-end and sending-end are constants as the values obtained from problem 3 , derive the power circle equation at receiving-end. (10%)