大同大學 97 學年度研究所碩士班入學考試試題

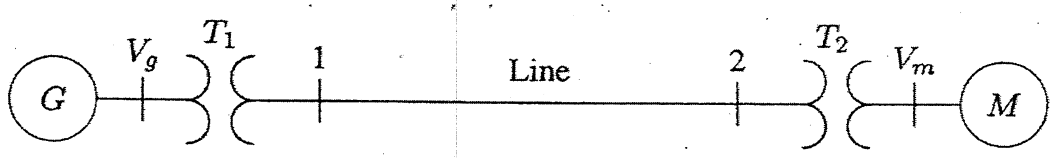
考試科目：電力系統　　所別：電機工程研究所　　第1頁

註：本次考試 不可以參考自己的書籍及筆記； 不可以使用字典； 可以使用計算器。

1. An industrial dryer operates at 600 volt and requires 50A. The unit consists of a fan in parallel with a heater. The fan draws 20kW and has a lagging power factor 0.8. Use a power triangle to find the resistance of the heater, assuming that it has unity power factor. **(25%)**

2. A balanced wye-connected load is connected to a 60Hz three-phase source with $V_{ab}=208\angle 0°$ volt. The load has pf=0.5 lagging, and each phase draw P_ϕ=6kW. (a)Calculate line current I_ℓ and find Z_y, $\underline{I}_a$, $\underline{I}_b$, and $\underline{I}_c$ in polar form. (b) What value of capacitance C should be put in parallel with each load element to minimize the current from the source, and what is the resulting line current? (Assuming the source is positive sequence!) **(25%)**

3. The three-phase power and line-line ratings of the electric power system shown in the following figure.



G_1:	60MVA	20 kV	X=9%
T_1:	50MVA	20/200 kV	X=10%
T_2:	50MVA	200/20 kV	X=10%
M:	43.2MVA	18 kV	X=8%
Line:		200 kV	Z=120+j200Ω

(a) Draw an impedance diagram showing all impedances in per-unit on a 100-MVA base. Choose 20 kV as the voltage base for generator.
(b) The motor is drawing 45MVA, 0.80 power factor lagging at a line-to-line terminal voltage of 18 kV. Determine the terminal voltage of the generator in per-unit and in kV. **(25%)**

4. The zero-, positive-, and negative-sequence bus impedance matrices for a three-bus power system are

$$Z^0_{bus} = j\begin{bmatrix} 0.20 & 0.05 & 0.12 \\ 0.05 & 0.10 & 0.08 \\ 0.12 & 0.08 & 0.30 \end{bmatrix} \; pu$$

$$Z^1_{bus} = Z^2_{bus} = j\begin{bmatrix} 0.16 & 0.10 & 0.15 \\ 0.10 & 0.20 & 0.12 \\ 0.15 & 0.12 & 0.25 \end{bmatrix} \; pu$$

Determine the per unit fault current and the bus voltage at bus 1 during fault for a bolted double line-to-ground fault at bus 2. **(25%)**