

大同大學九十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 全 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； 不可以使用計算器。

1. Two 1ϕ transformers are connected in parallel on both the high- and low-voltage sides and have the following characteristics: Transformer A, 100 KVA, 2300/120 V, 0.006Ω resistance, and 0.025Ω leakage reactance referred to the low-voltage side, Transformer B, 150 KVA, 2300/115 V, 0.004Ω resistance, and 0.015Ω leakage reactance referred to the low-voltage side. A 125 KW load at 0.85 PF lagging is connected to the low-voltage side with 125 V at the terminal of the transformer. Determine the primary voltage and current supplied by each transformer. 20%
2. A 3ϕ synchronous motor is rated 2200 V, 100 KVA, 60 Hz. It is being operated to improve the power factor in a factory; overexcitation results in its operating at leading PF of 0.75 at 75 KW full load. Determine (a) the reactive power in KVAR delivered by the motor. (b) draw the power triangle, and (c) determine the PF needed for the motor to deliver 50 KVAR with a 75 KW load. 15%
3. Draw a flow chart of computer program which is used to form a Y -bus matrix. The input data include (a) from bus (i), (b) to bus (j), and (c) impedance $[Z]$ between bus (i) and bus (j). The shunt elements of transmission line and the tap of transformer are neglected. 20%
4. The subtransient bus impedance matrix for a 3ϕ power system is $[Z'_{bus}]$. The Prefault voltage is 1.0 P.U., and Prefault current is neglected. If there is a 3ϕ short circuit occurred at bus "2" and touch the ground through a fault impedance (Z_f) of 0.1 P.U. 15%
- $$Z'_{bus} = j \begin{bmatrix} 0.12 & 0.08 & 0.04 \\ 0.08 & 0.12 & 0.06 \\ 0.04 & 0.06 & 0.08 \end{bmatrix} \text{ P.U.}$$
- (a) Determine the fault current to the ground. (b) Find the voltage at bus "1" and bus "3" during the fault.
5. Show that if the stator voltages V_1 and V_2 of a 2ϕ induction motor are in quadrature but unequal, the starting torque (T_s) is the same as that developed when balanced 2ϕ voltages of $(V_1 V_2)^{1/2}$ are applied. 15%
6. A DC series motor takes a current of 50 A from a 250 V supply to drive a load at 600 rpm. The resistance of the motor between its terminals is 0.35Ω . If the field flux at 15 A is half of its value at 50 A. What is the speed of the motor when it takes a current at 15 A, from a 250 V supply? 15%