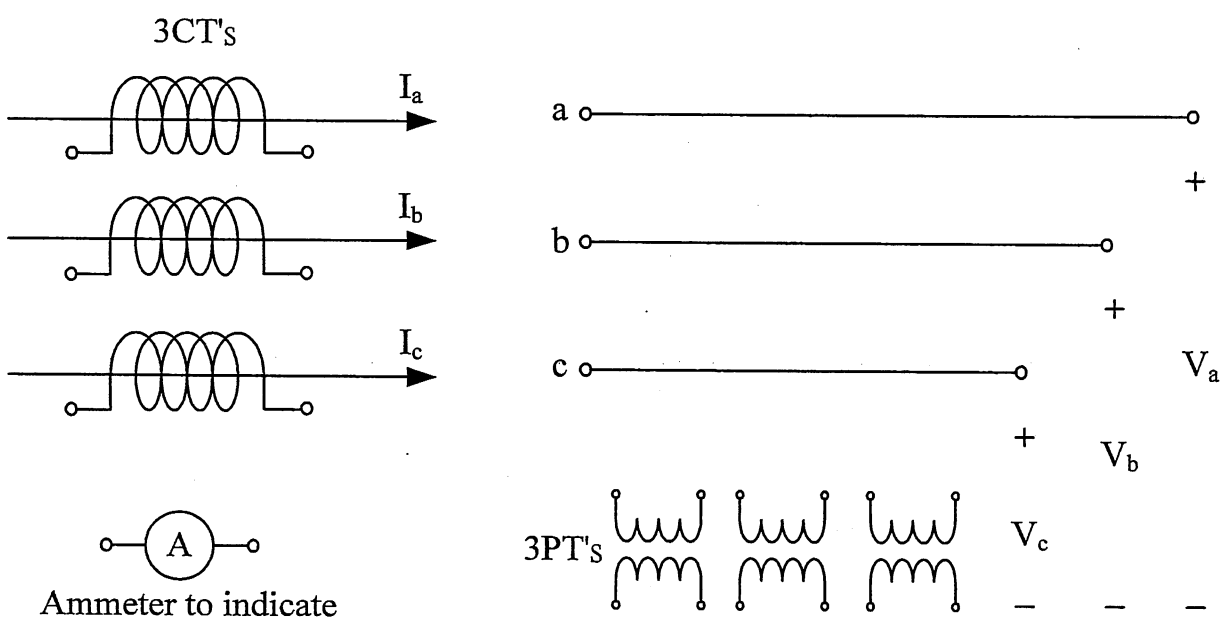
大同大學 99 學年度研究所碩士班入學考試試題

考試科目:電力系統　　所別:電機工程研究所　　

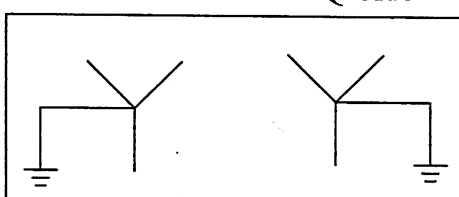
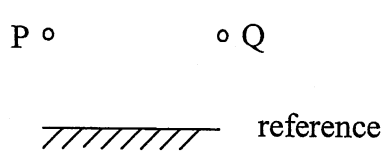
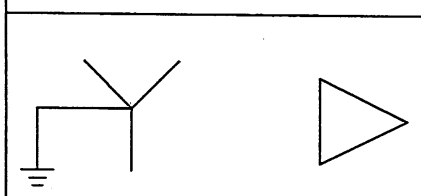
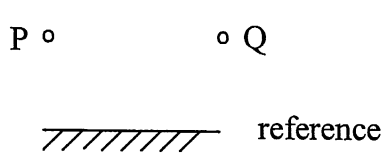
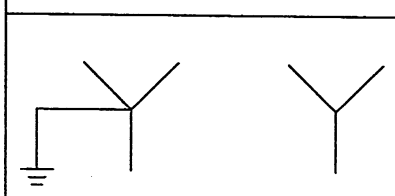
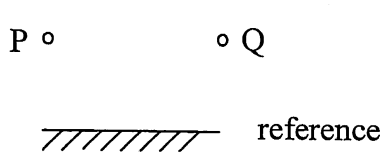
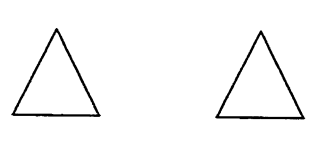
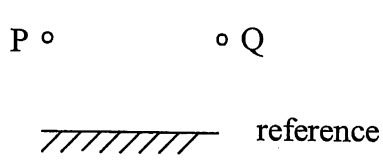
註:本次考試 不可以參考自己的書籍及筆記； 不可以使用字典； 可以使用計算器。

1. A 1000 kW turbine-generator set (turbine capability of 1250 kW) is already operating at rated load, 1250kVA and 0.8 power factor. An additional load of 170kW at 0.85 power factor is to be added. What value of capacitors is required so that neither the turbine nor the generator will be overloaded? (20%)

2. Draw the diagrams of connection for measuring zero-sequence quantities (current, voltage) as indicated. (10%)



3. Draw the zero-sequence equivalent circuit for the following transformer connections. (10%)

P-Side	Q-Side	Zero-Sequence Equivalent Circuit
		
		
		
		

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4. The series-impedance matrix of a perfectly balanced line with one ground wire is

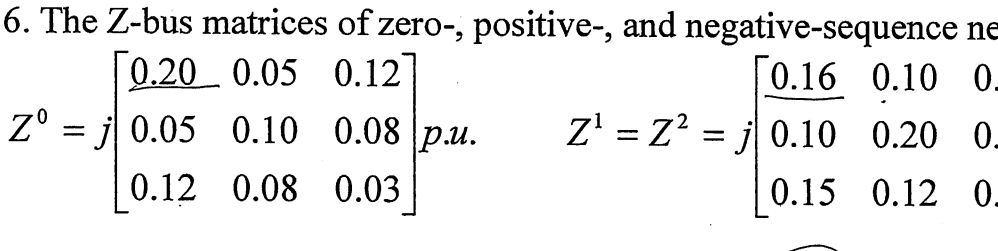
$Z_{abc\text{-}g} =$

a	j3.5	j2.5	j2.5	j1
b	j2.5	j3.5	j2.5	j1
c	j2.5	j2.5	j3.5	j1
d	j1	j1	j1	j2

(a) Find Z_0, Z_1 for this line

(b) If $I_a=10\angle 0^\circ$, $I_b=11\angle -90^\circ$ and $I_c=8\angle 150^\circ$; find the zero-, positive- and negative-sequence voltage line drops. (20%)

5. A power system is shown in the following figure with the parameters as indicated. Find (a) δ_2, (b) Q_L, (c) P_{G3}, and (d) Q_{G3}. (20%)



6. The Z-bus matrices of zero-, positive-, and negative-sequence networks for a power system are

$$Z^0 = j\begin{bmatrix} 0.20 & 0.05 & 0.12 \\ 0.05 & 0.10 & 0.08 \\ 0.12 & 0.08 & 0.03 \end{bmatrix} p.u. \qquad Z^1 = Z^2 = j\begin{bmatrix} 0.16 & 0.10 & 0.15 \\ 0.10 & 0.20 & 0.12 \\ 0.15 & 0.12 & 0.25 \end{bmatrix} p.u.$$

If there is a single line-to-ground fault occurred at bus 1 with fault impedance of j0.08p.u.. Determine (a) the per-unit fault current and (b) the three-phase voltages of bus 1 during the fault. (20%)