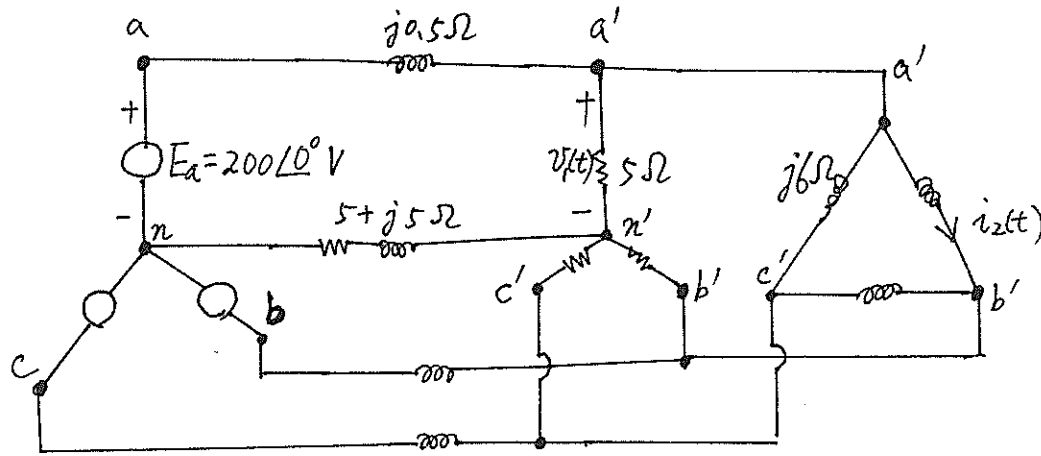
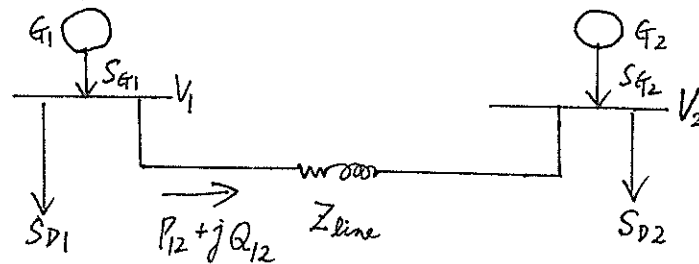


1. Given the balanced three-phase system shown below, find $v_1(t)$ and $i_2(t)$. (12%)



2. Assume that $|V_1| = 1.05$, $|V_2| = 0.95$, $Z_{line} = 0.1 \angle 85^\circ$. Find $P_{12 \max}$. (11%)



3. Draw an impedance diagram and compute the per unit impedances for the system whose one-line diagram is shown below. The three-phase and line-line ratings are as follows:

Generator: 30 MVA, 13.8 KV, reactance = 0.12 p.u.

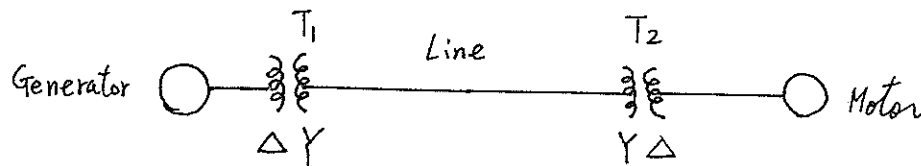
Motor: 20 MVA, 13.8 KV, reactance = 0.1 p.u.

T_1 : 20 MVA, 13.2-13.2 KV, leakage reactance = 0.08 p.u.

T_2 : 15 MVA, 13.8-13.8 KV, leakage reactance = 0.1 p.u.

Line: $20 + j 110$ ohms (actual)

Pick the generator ratings for the bases in the generator section. (10%)

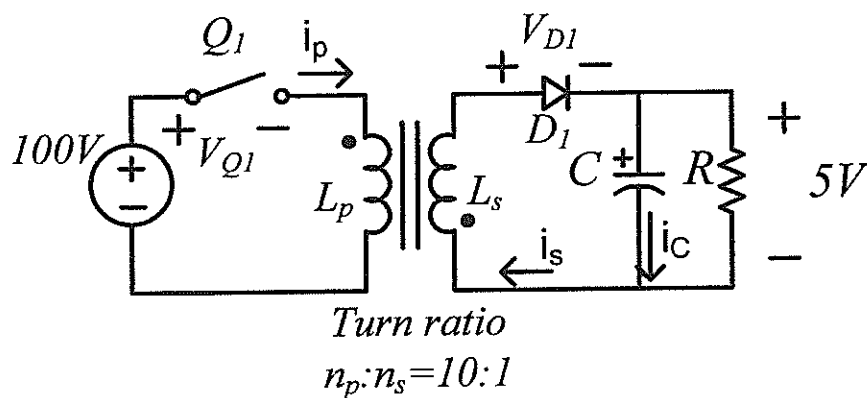


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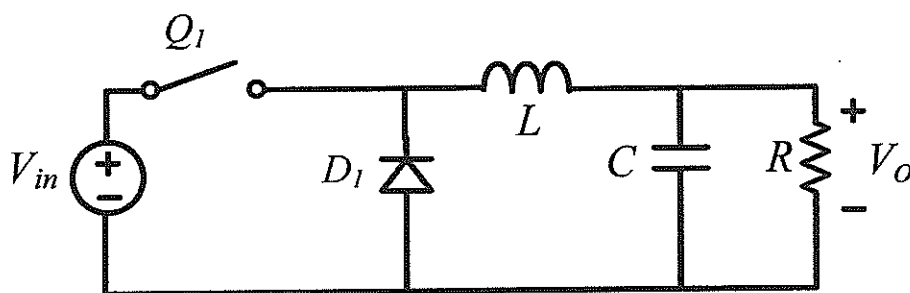
4. A transformer is to be used to transform the impedance of a $2\ \Omega$ resistor to an impedance of $200\ \Omega$. Calculate the required turn ratio, assuming the transformer to be ideal. (16%).
5. What percentage of its rated output will a salient-pole synchronous machine deliver without loss of synchronism when operating as a motor with rated applied voltage and with the field excitation zero if $X_d = 0.85$ per unit and $X_q = 0.60$ per unit? (17%)

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6. Given $L_p=100\mu\text{H}$, switching frequency $f_s=100\text{kHz}$, C is very large, Output power= 50W . Assuming ideal switches.



- Derive duty cycle value D of Q_1 . (6%)
 - Sketch the time waveforms of V_{D1} , i_p , and i_c . Derive and indicate important values such as peak and valley values and time values. (12%)
 - Assume the polarity of diode D_1 is reversed (Anode of D_1 is connected to C instead of L_s). Sketch the time waveforms of V_{Q1} , i_p . Please also explain the reason of the waveform shape. (8%)
7. A Buck converter is operated in boundary mode conduction (BCM). That is, inductor current falls to zero right before the instant of Q_1 turn-on. Assuming Q_1 and D_1 are ideal switches. C is very large. Switching frequency is f_s . Please express inductance L by other variables. (8%)



試題隨卷繳回