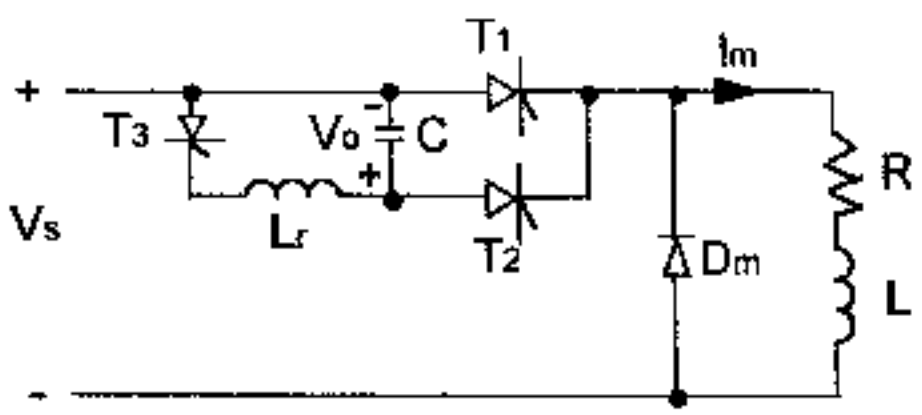


八十五學年度 電機工程學系(所) 甲 組碩士班研究生入學考試

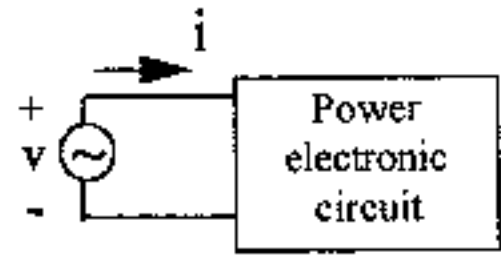
科目 電力電子 科號 2904 共 2 頁第 1 頁 *請在試卷【答案卷】內作答

1. What are the problems of series-connected diodes, and what are the possible solutions? (15%)
2. What is the significance of (a) the form factor, (b) the ripple factor, of a rectifier? (15%)
3. A three-phase bridge rectifier is supplied from a wye-connected 208V 60Hz supply. The average load current is 60A and has negligible ripple. Calculate the output voltage reduction due to commutation if the line inductance per phase is 0.5 mH. Assume that during commutation the current rises or drops linearly with time. (10%)
4. (a) Explain the operating principle of the following impulse-commutated circuit,
(b) What is the available turn-off time? (10%)



5. The rms harmonic currents of $i(t)$ normalized to I_1 are listed as follows:

h	3	5	7	9	11
I_h/I_1	0.3	0.25	0.2	0.15	0.1

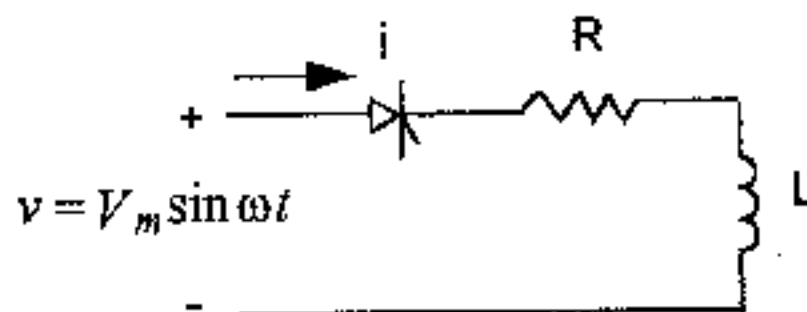


(1) find the current %THD=? (2) if the displacement power factor is unity, find the power factor PF=? (10%)

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6. For the SCR series circuit as shown, if the triggering angle is $\alpha < \pi$ and the current is discontinuous, find the current $i(t)$ expression using the given circuit parameters and the equation for finding the extinction angle β . (10%)



7. (1) Draw a single-phase full-bridge inverter circuit and its SPWM unipolar switching control circuit including comparators and lockout circuits.
 (2) Briefly describe the operation principle of this SPWM inverter.
 (3) Sketch the output voltage waveform and its harmonic spectrum. (15%)
8. (1) Draw a single-phase dual input voltage (110V/220V) rectifier with inrush current limiting, and describe its operation.
 (2) Draw the block diagram of a typical isolated switching-mode DC power supply, and describe its major advantages and disadvantages. (15%)