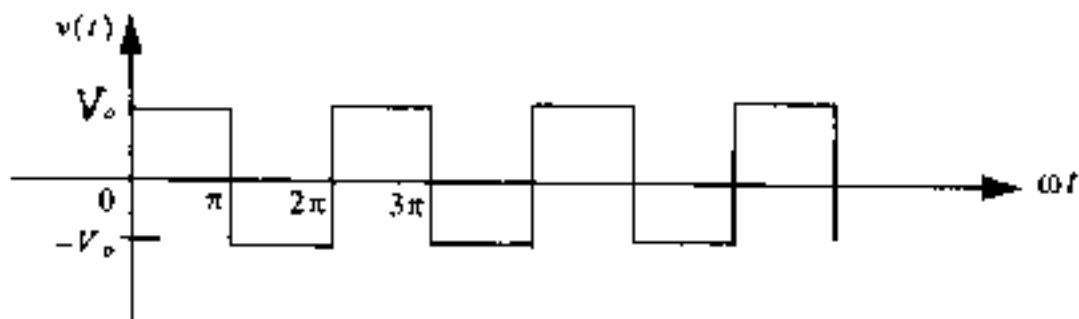
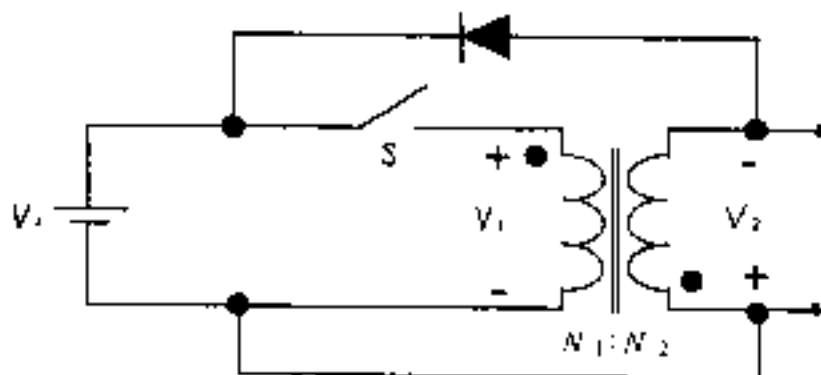


八十六學年度 電機工程學系(所) 甲 組碩士班研究生入學考試
 科目 電力電子 科號 3004 共 2 頁第 1 頁 *請在試卷【答案卷】內作答

- (a) Describe the static and dynamic characteristics of power semiconductor diodes; (b) Classify the power diodes according to the recovering characteristics and manufacturing techniques. (15%)
- Given the following periodic waveform $v(t)$, find the total harmonic factor. (10%)



- In a practical circuit it is usually desirable to improve the efficiency by returning the stored energy of an inductor into the supply source. The following circuit which adds a coupled second winding to the inductor is one example. Please explain the operation principle and state the advantages and disadvantages of this method. (10%)

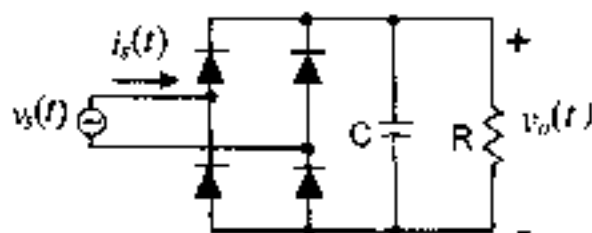


八十六學年度 電機工程學系(所) 甲 組碩士班研究生入學考試

電力電子 科號 3004 共 2 頁第 2 頁 *請在試卷【答案卷】內作答

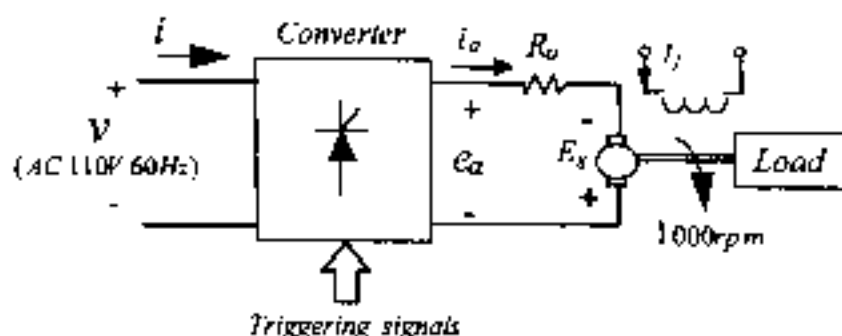
4. Given the following rectifier circuit assume the diodes are ideal diodes, and $v_s(t) = \sqrt{2}V \sin \omega t, t \geq 0, v_s(0) = 0$

- (a) Find $i_s(t)$ and $v_o(t)$ for $0 \leq \omega t \leq 2\pi$.
- (b) Plot the corresponding waveforms.
- (c) Discuss the disadvantages of this circuit. (15%)



5. A separately excited dc motor is controlled by a single-phase full-converter as shown. The armature resistance of motor is $R_a = 0.05 \Omega$. When the triggering angle is $\alpha = 120^\circ$, the armature current is $i_a = 10A = \text{constant}$ (i.e., ripple-free) and the rotor speed is $N = 1000 \text{rpm}$:

- (a) Draw the power circuit of this converter.
- (b) Draw the waveforms of v_s, i, e_a, i_a .
- (c) Find the average motor terminal voltage E_a of e_a .
- (d) Find the motor back emf E_b .
- (e) Describe the operation modes of motor and converter.
- (f) Find the motor torque (in N.m). (30%)



6. The waveforms of a transistor switch are as shown. Find the following power losses: (1) switching loss P_s ; and (2) conduction loss P_c . (20%)

