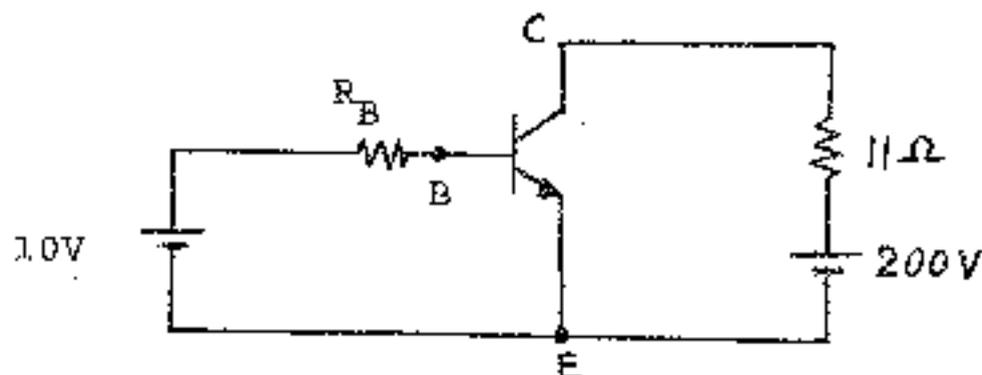


八十四學年度 電機 所 甲 組碩士班研究生入學考試

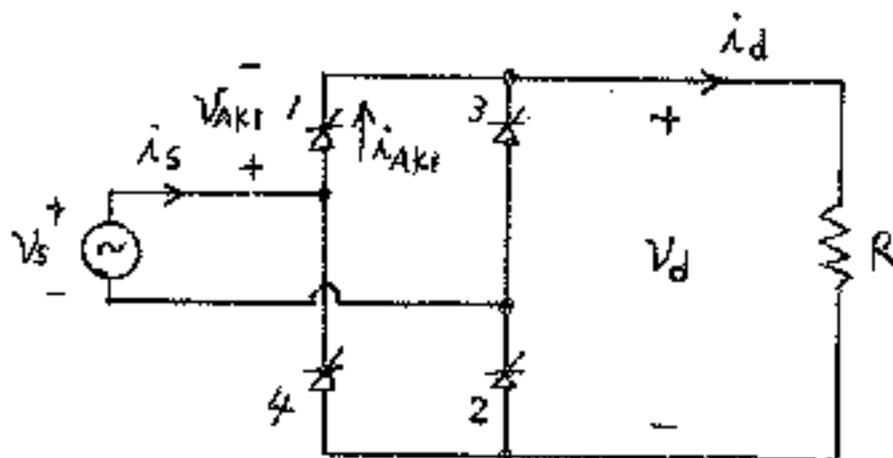
科目 電力電子

科號 2204 共 2 頁第 1 頁 \*請在試卷【答案卷】內作答

1. In the following circuit, the bipolar transistor has the parameters of  $V_{CE(sat)}=1.0V$ ,  $V_{BE(sat)}=1.5V$  and  $\beta=8$ , find (a) the value of  $R_B$  to result in saturation with an overdrive factor of 5; (b) the forced  $\beta_f$ . (15%)



2. (a) Draw the switching model of MOSFETs.  
 (b) Draw a typical switching waveform and define the turn-on delay time, rise time, turn-off delay time and the fall time. (15%)
3. What are the advantages and disadvantages of using (a) pulse transformers (b) optocouplers for floating or isolating the gate signals of transistors with respect to ground? (15%)
4. In the following converter circuit,  $v_s = \sqrt{2}V_s \sin \omega t$  and the triggering angle  $\alpha = 90^\circ$ :  
 (1) Sketch the waveforms of  $v_s$ ,  $i_s$ ,  $v_d$ ,  $i_d$ ,  $v_{AK1}$  and  $i_{AK1}$ .  
 (2) Determine (a) average value of  $v_d$ ; (b) average value of  $i_{AK1}$ ; (c) rms value of  $i_{AK1}$ ; and (d) input power factor. (20%)

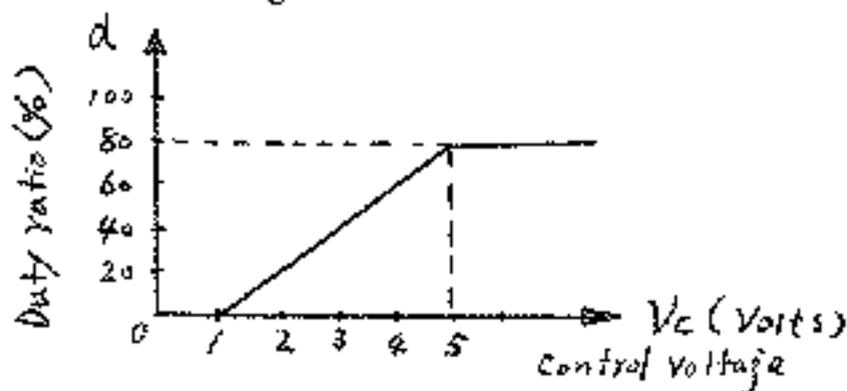


5. Explain the following terms:  
 (1) Foldback current limiting; (2) Blanking time; (3) ESR;  
 (4) Current-mode control. (10%)

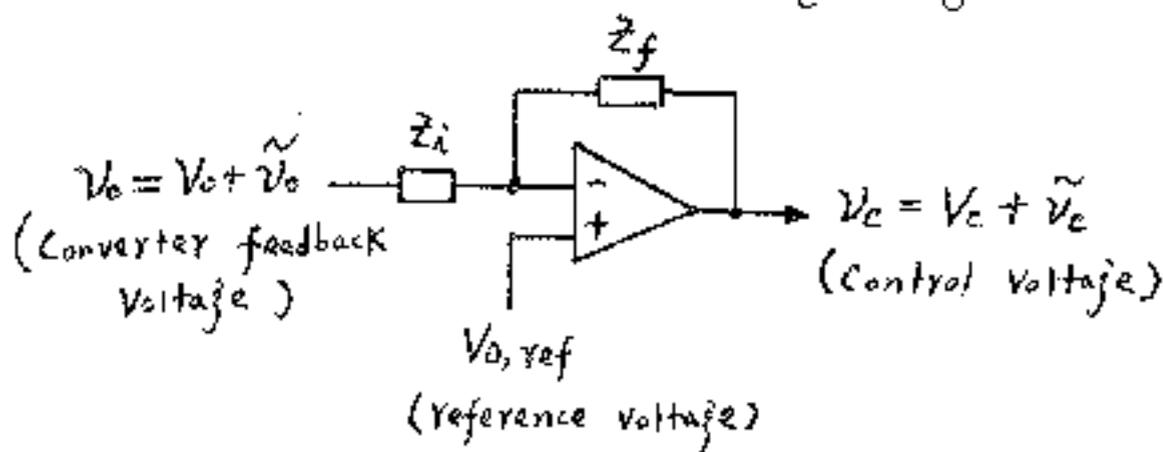
八十四學年度 電機 所 甲 組碩士班研究生入學考試

科目 電力電子 科號 2204 共 2 頁第 2 頁 \*請在試卷【答案卷】內作答

6. (1) If the transfer characteristic between the duty-ratio  $d$  and the control voltage  $v_c$  is as shown, find the transfer function of  $\tilde{d}(s)/\tilde{v}_c(s)$ . (10%)



- (2) For the compensated error amplifier circuit as shown, find the transfer function  $\tilde{v}_c(s)/\tilde{v}_o(s)$ .



7. For the three-phase bridge inverter with its gating signals as shown, draw the following waveforms: (1)  $v_{ab}, v_{bc}, v_{ca}$  and (2)  $v_{an}, v_{bn}, v_{cn}$ . (15%)

