

# 國立彰化師範大學107學年度碩士班招生考試試題

系所： 車輛科技研究所

選考戊

科目： 電子學

☆☆請在答案紙上作答☆☆

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1. 汽車的交流發電機輸出交流電，經過整流後對電池充電。請說明你如何設計一個整流電路對電池充電。 (20%)
2. 汽車的電動窗使用直流馬達控制，汽車電池為 12V 直流。請說明你如何改變直流電壓，以控制直流馬達。 (20%)
3. 台灣的 3C 產業紛紛跨入汽車電子，請說明汽車電子與一般電子有何不同。 (20%)
4. Figure 1(a) is a circuit in which the transistor is biased in the cutoff region. Estimate the currents using the simplified model in Figure 1(b) and 1(c). (20%)

Given Data: From the figure,  $I_S = 10^{-16}$  A,  $\alpha_F = 0.95$ ,  $\alpha_R = 0.25$ ,  $V_{BE} = 0$  V,  $V_{BC} = -5$  V

where  $\frac{1}{\alpha_R} = 1 + \frac{1}{\beta_R}$

Find :  $I_C, I_B, I_E$

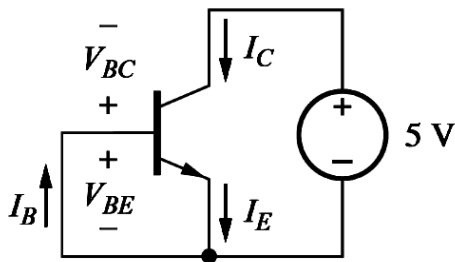


Figure 1(a)

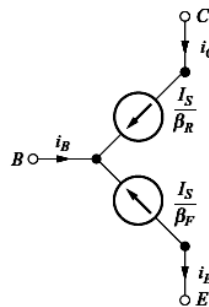


Figure 1(b)

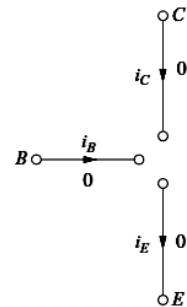


Figure 1(c)

5. If the amplifier with  $R_1 = 3$  k $\Omega$ ,  $R_2 = 43$  k $\Omega$ , and  $V_i = +0.1$  V in Figure 2. Find the voltage gain  $A_v$ , output voltage  $V_o$ , and output current  $i_o$ . (assume  $R_{in} = \infty$ ,  $R_{out} = 0$ ) (20%)

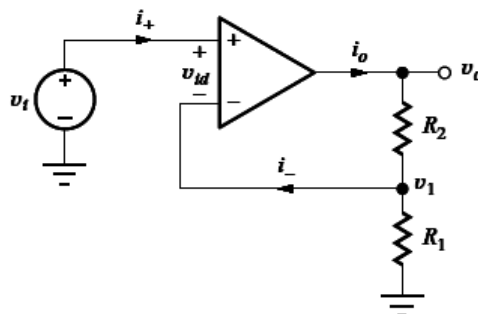


Figure 2