國立成功大學 79 學年度医工所入學考試(電子學 試題) 共 2 頁 第 1 頁

一. (1) 对图 1. 之 Switched Capacitor 电路而言，(a) 试绘出 Φ, 与 $\bar{\Phi}$ 之控制讯号波形
(b) 其所代表的一般电路之电路图.

(2) 试绘出图 2 电路的等效 Switched Capacitor 电路.

(15%)

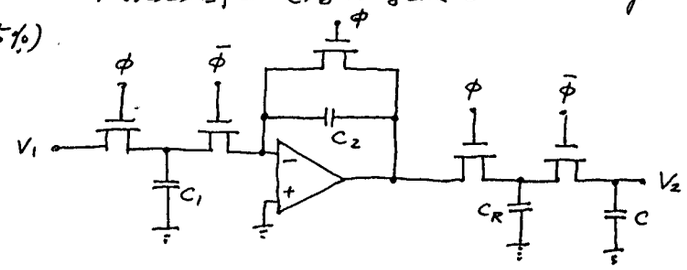


图 1.

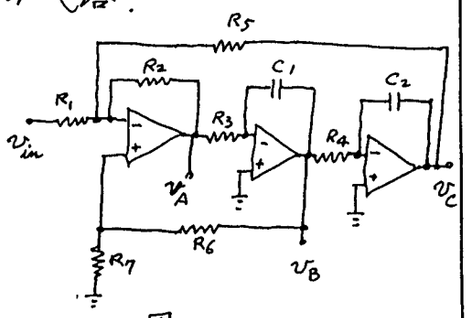
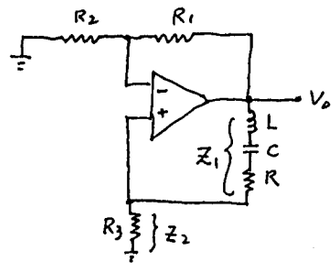


图 2.

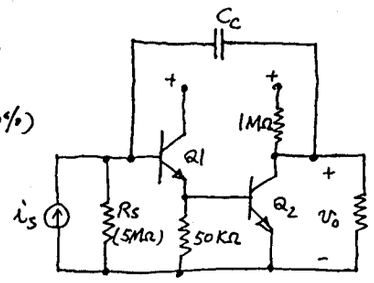
二.



(15%)

对左图之 Wien-Bridge Oscillator 而言，试
(1) 导出振盪频率
(2) 求出 R_1/R_2 之最小比值.

三.

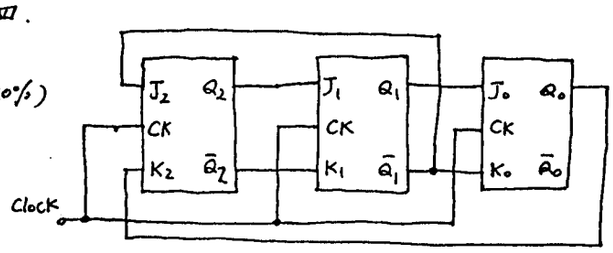


(20%)

左图中之电晶体 Q_1 与 Q_2 特性相同，其 $\beta_0 = 250$, $V_A = 125V$
$f_T = 400MHz$, $C_\mu = 0.5pF$; $I_{CQ_1} = 5\mu A$, $I_{CQ_2} = 250\mu A$.
(1) 求 $\omega = 0$ 时，试求 R_i, R_o 与 V_o/I_s
(2) 若 Dominant Pole frequency 为 10 Hz，试求 C_C.

[註] β_0 = ac CE forward short-circuit current gain.
C_μ = depletion region capacitance of the reverse-biased CB junction. V_A = Early Voltage
f_T = the frequency at which the CE short circuit current gain has unit magnitude.

四.



(20%)

(1) 左图电路中，若起始状态为 $Q_0=0, Q_1=0, Q_2=1$，试列出每一 Clock pulse 输入之後 Q_0, Q_1, Q_2, J_2, K_2 之状态变化表且共需经过多少 Clock pulse 之後才会完成一个循环？(亦即左图为除以多少的 Counter)

(2) 若起始状态为 $Q_0=0$, $Q_1=1$, $Q_2=0$，请重作 (1) 之问题.

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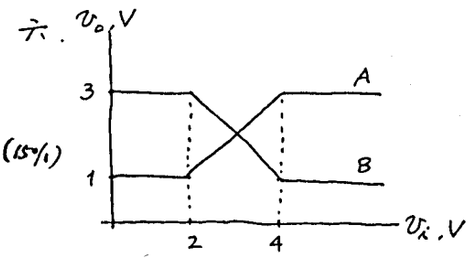
五. Use a multiplexer to generate the combinational-logic equation

$$Y = \bar{D}CBA + D\bar{C}BA + D\bar{C}B\bar{A} + \bar{D}C\bar{B}\bar{A} + DC\bar{B}\bar{A} + \bar{D}C\bar{B}A + DCB\bar{A} + \bar{D}CB\bar{A}$$

(15%) How many data inputs are needed? Find the values of the data inputs X.

六. (15%)



(a) A sinusoid $v_i(t) = 3 + 2\sin\omega t$ is applied to a diode network whose voltage transfer characteristic is denoted by A. Sketch the output waveform $v_o(t)$ for one cycle.

(b) What changes would you expect in the output waveform if B is the voltage transfer characteristic of the network?

(c) Using ideal diodes, design a circuit having the A characteristic.