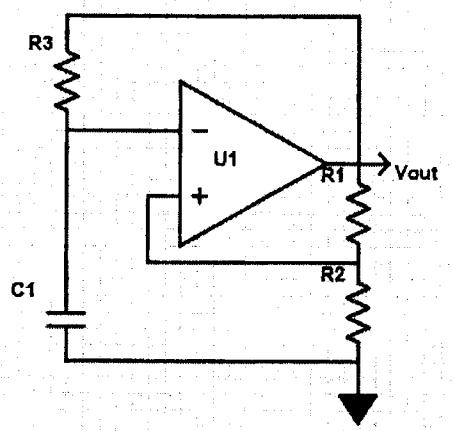
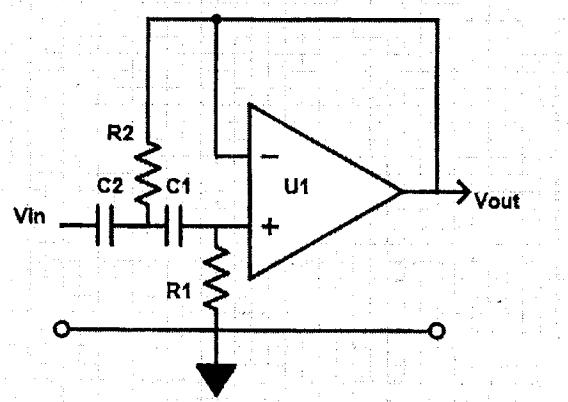


※ 考生請注意：本試題不可使用計算機。 請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Given the following self oscillation circuit. Let  $R_1 = R_2 = R_3 = 10K \Omega$ . (a) If the required oscillatory frequency is set to 2 KHz, find the value of the capacitor  $C_1$ . (15%) (b) Draw the output waveform,  $V_{out}$ . (10%)



2. Given the following high pass filter circuit. Let  $R_1 = R_2 = 10K \Omega$ ,  $C_1 = 0.1\mu F$  and  $C_2 = 0.2\mu F$ . (a) Find the cut-off frequency. (10%) (b) Give the transfer function. (10%) (c) Sketch its Bode-plot with respect to the input and output voltages. (10%) (d) Give the Q factor. (5%)



3. Given the following circuit which contains a current source. Let  $V_{cc} = 5V$ , the saturation current  $I_{s1} = I_{s2} = I_{s3} = 10^{-12} A$ ,  $\beta_1 = \beta_2 = \beta_3 = 50$ , the thermal voltages of the transistors be 26 mV,  $R_1 = R_4 = 50 \Omega$ , and  $R_2 = R_3 = 0.5 \Omega$ . (a) Find the collector output current of  $Q_1$ . (15%) (b) Draw the small signal model of the complete circuit. (15%) (c) Find the output impedance of the current source and the output impedance of the complete circuit (10%).

