ELECTRICAL ENGINEERING DEPARTMENT
EEL 204 ANALOG ELECTRONIC CIRCUITS
TUTORIAL SHEET 2

January 18, 2011

Q1. An amplifier shown in Fig. 1 has a transistor with $100 \leq \beta \leq 300$. The transistor has V_{BE} = 0.7V. If R_{BB} is 1KΩ, find the maximum possible symmetrical swing. Find R_1, R_2, R_C and R_E given that I_{CQ} = 5mA. What is the maximum deviation from the design specification of I_{CQ}?

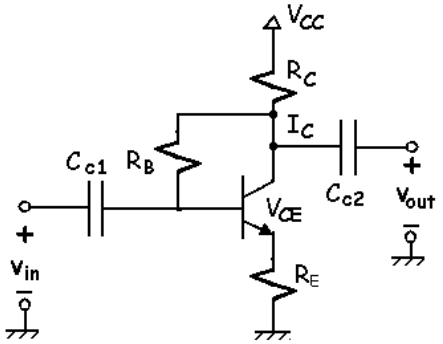

Fig. 2

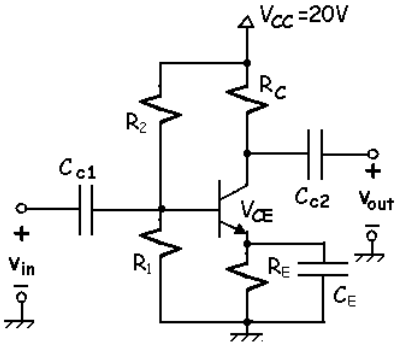

Fig. 1

Q2. For the amplifier configuration in Fig. 1, starting from $I_C = \beta I_B + (\beta+1) I_{CBO}$ obtain a relationship for the collector current. The transistor ICBO = 0.1μA and the temperature ranges between -25°C to 75°C. How will the maximum swing over the temperature range affect the maximum possible symmetrical swing? The change in I_{CBO} is modeled as $\Delta I_{CBO} = I_{CBO}\left(\exp(0.07\Delta T) - 1\right)$.

Q3. Find out the relationship for I_{CQ} in the amplifier configuration shown in Fig.2 and identify the condition to obtain I_{CQ} independent of variations in β. Given that V_{CC} = 12V, I_{CQ} = 5mA, obtain R_B, R_C and R_E for maximum symmetric swing at the output. Also obtain the gain of the amplifier.

Q4. For the Common Emitter Amplifier in Fig. 3 given that β = 100, I_C = 1mA, V_{BE} = 0.75V and $C_E \longrightarrow \infty$, find

1. The value of the resistance R_{E1}
2. The value of the resistance R_C
3. The gain (v_o/v_s)
4. The maximum peak to peak swing achievable for an undistorted sinusoidal output.

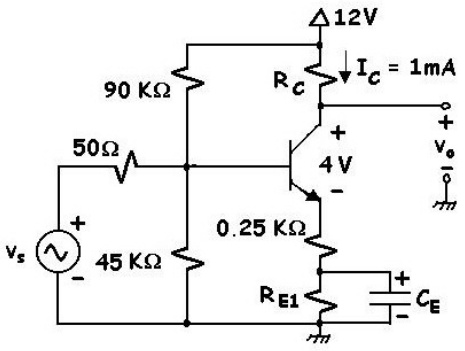

Fig. 3