



$$V_A = V_i \cdot \frac{R_1}{R_1 + \frac{1}{sC_1}} = V_i \cdot \frac{sCR_1}{sCR_1 + 1} = V_i \cdot \frac{s}{s + \frac{1}{CR_1}}$$

$$(V_o - V_A) \cdot sC = \frac{(V_A - V_i)}{R_5}$$

$$V_o \cdot sC \cdot R_5 - V_A \cdot sC \cdot R_5 = V_A - V_i$$

$$V_o \cdot sC \cdot R_5 + V_i = V_A (1 + sC \cdot R_5)$$

$$V_A \cdot \left(\frac{1}{R_1} + \frac{1}{R_2} + sC \right) - V_i \cdot sC - V_o \cdot \frac{1}{R_2} = 0 \quad (3)$$

$$V_A \cdot \left(\frac{1}{R} + \frac{1}{R} \right) - V_B \cdot \frac{1}{R} - V_o \cdot \frac{1}{R} = 0$$

$$\rightarrow V_A \cdot \left(\frac{2}{R} \right) - V_o \cdot \frac{1}{R} = V_B \cdot \frac{1}{R} \rightarrow V_B = 2V_A - V_o \quad (1)$$

$$V_A = \frac{1}{sCR_5 + 1} (V_o \cdot sC \cdot R_5 + V_i) \quad (2)$$

$$(1) \rightarrow (2) \rightarrow (3) \quad \frac{1}{sCR_5 + 1} (V_o \cdot sC \cdot R_5 + V_i) \left(\frac{1}{R_1} + \frac{1}{R_2} + sC \right) - V_i \cdot sC - (2V_A - V_o) \cdot \frac{1}{R_2} = 0$$

$$\left(V_o \cdot \frac{sCR_5}{sCR_5 + 1} + \frac{V_i}{sCR_5 + 1} \right) \left(\frac{1}{R_1} + \frac{1}{R_2} + sC \right) - V_i \cdot sC + \frac{V_o}{R_2} - \frac{2}{R_2} \cdot \frac{1}{sCR_5 + 1} (V_o \cdot sC \cdot R_5 + V_i) = 0$$

$$\frac{V_o \cdot sCR_5}{R_1(sCR_5 + 1)} + \frac{V_o \cdot s^2 C^2 R_5}{sCR_5 + 1} + \frac{V_i}{R_1(sCR_5 + 1)} + \frac{V_i \cdot sC}{sCR_5 + 1} - V_i \cdot sC + \frac{V_o}{R_2} - \frac{V_o \cdot sCR_5}{R_2(sCR_5 + 1)} - \frac{V_i}{R_2(sCR_5 + 1)} = 0$$

$$V_o \left(\frac{sCR_5}{R_1(sCR_5 + 1)} + \frac{s^2 C^2 R_5}{sCR_5 + 1} + \frac{1}{R_2} - \frac{sCR_5}{R_2(sCR_5 + 1)} \right) = V_i \left(sC + \frac{1}{R_2(sCR_5 + 1)} - \frac{1}{R_1(sCR_5 + 1)} - \frac{sC}{sCR_5 + 1} \right)$$

$$\frac{V_o}{V_i} = \frac{sC.R_1.R_2 (sCR_5+1) + R_1 - R_2 - sCR_1R_2}{sCR_5.R_2 + s^2C^2R_5R_1R_2 + R_1(sCR_5+1) - sCR_5R_1}$$

$$\frac{V_o}{V_i} = \frac{s^2C^2R_1R_2R_5 + sCR_1R_2 + R_1 - R_2 - sCR_1R_2}{s^2C^2R_5R_1R_2 + sCR_5R_2 + sCR_5R_1 + R_1 - sCR_5R_1}$$

$$T(s) = \frac{s^2 + \frac{R_1 - R_2}{C^2R_1R_2R_5}}{s^2 + s \frac{1}{C.R_1} + \frac{1}{C^2R_5R_2}}$$