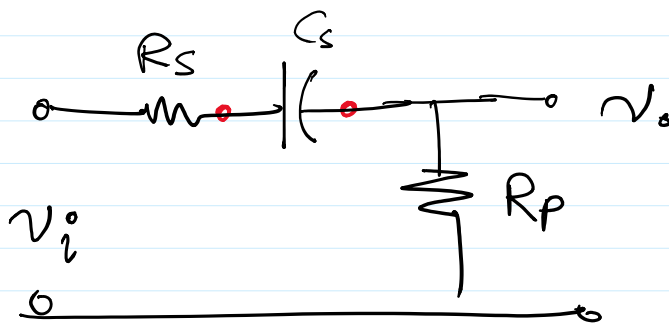
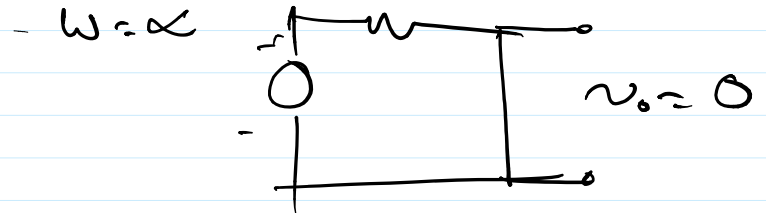
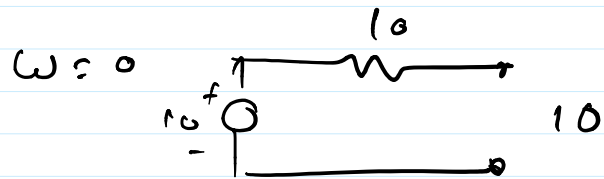
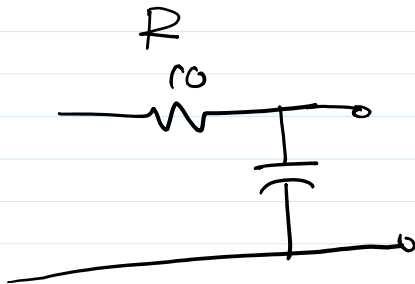
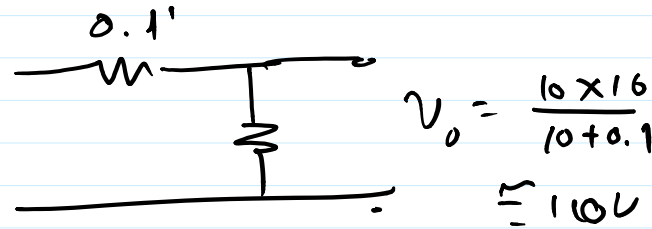
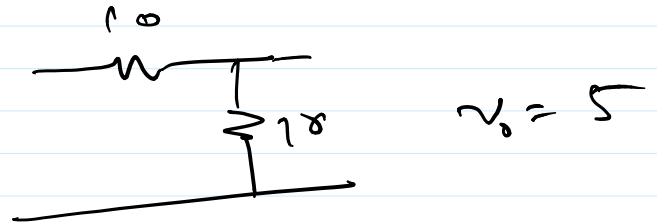
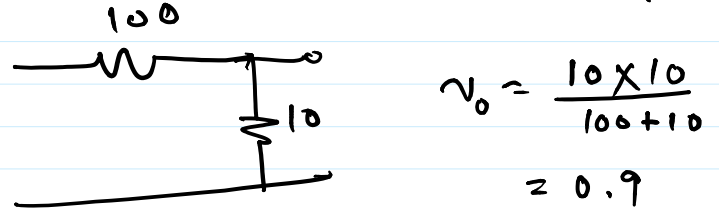
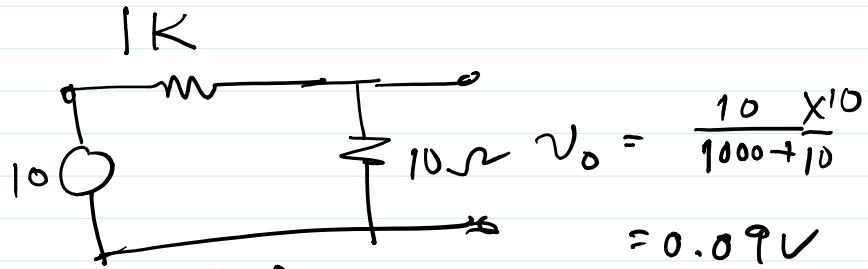
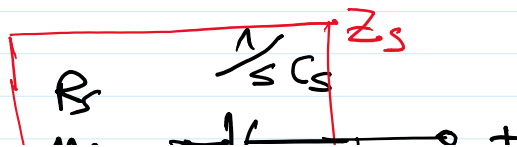


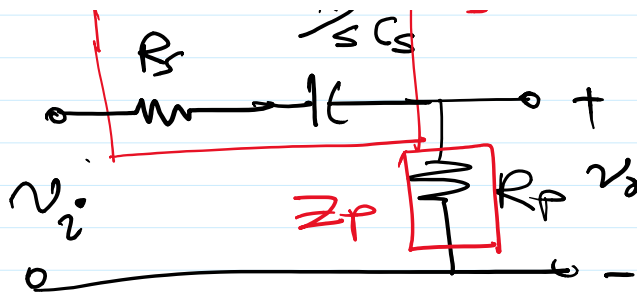
E 3-2-2



$$T = \frac{v_o}{v_i}$$

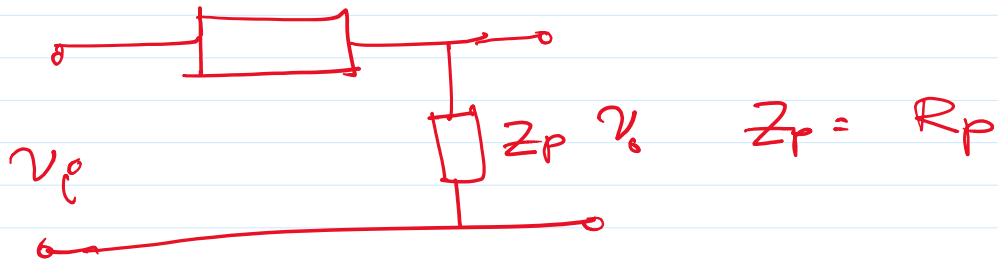


$$T = \frac{v_o(s)}{v_i(s)}$$



$$T = \frac{v_o(s)}{v_i(s)}$$

$$Z_s = R_s + \frac{1}{sC_s}$$



$$v_o = \frac{Z_p}{Z_p + Z_s} v_i$$

$$T(s) = \frac{v_o}{v_i} = \frac{Z_p}{Z_p + Z_s} = \frac{R_p}{1 + (R_p + R_s) s C_s}$$

$$Z_p + Z_s = R_p + R_s + \frac{1}{sC_s} = \frac{1 + (R_p + R_s) s C_s}{s C_s}$$

$$T(s) = \frac{R_p s C_s}{1 + (R_p + R_s) s C_s}$$

$$= \frac{R_p}{R_p + R_s} \cdot \frac{s C_s (R_p + R_s)}{1 + (R_p + R_s) s C_s}$$

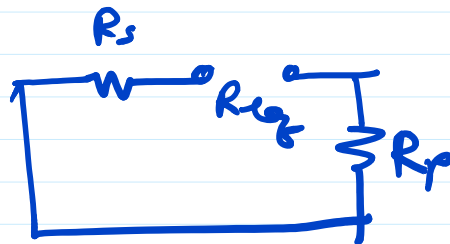
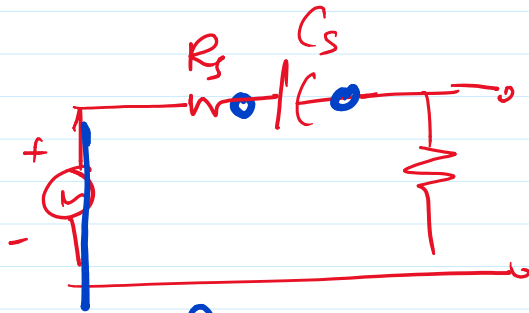
$$= K \frac{s \tau_s}{1 + (R_p + R_s) s C_s} \quad \tau_s = C_s (R_p + R_s)$$

$$= K \frac{s \tau_s}{1 + s \tau_s}$$

$$\tau_s = C_s (R_p + R_s)$$

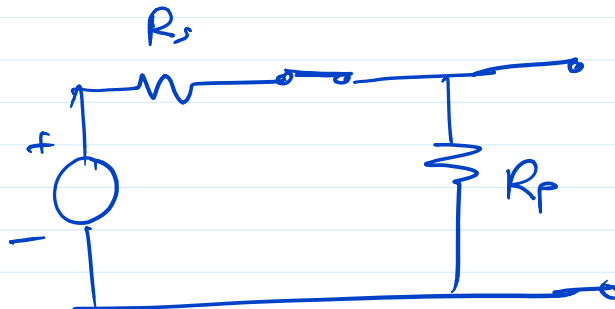
Time constant

$$\tau = C_s R_{eq}$$



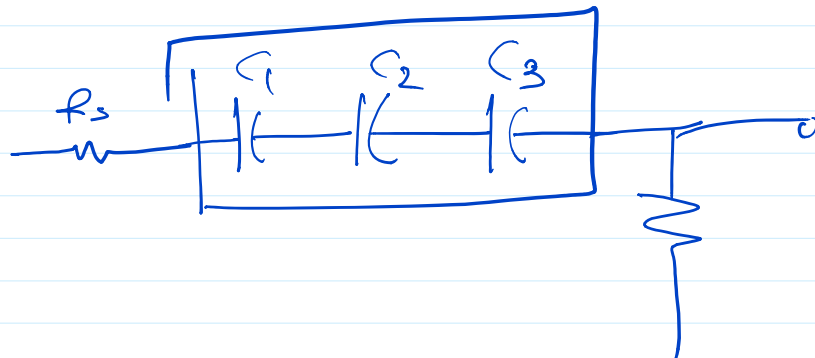
$$R_{eq} = R_s + R_p$$

$$\tau = C_s (R_s + R_p)$$

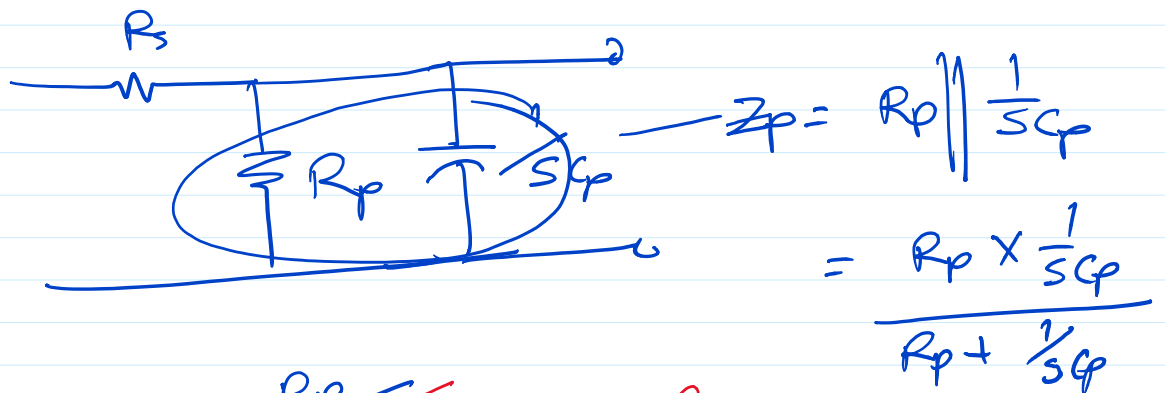
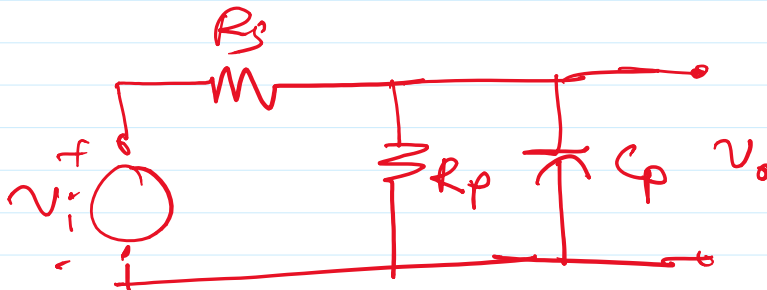
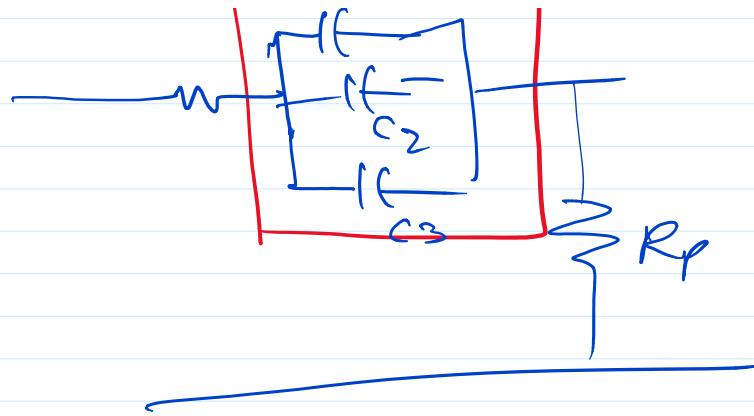


$$T^{(s)}_{mid} = \frac{R_p}{R_p + R_s} = K$$

$$\frac{1}{C_s} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$$



$$C_s = (C_1 + C_2 + C_3)$$



$$Z_p = \frac{\frac{R_p}{sC_p}}{\frac{1 + sC_p R_p}{sC_p}} = \frac{R_p}{1 + sC_p R_p}$$

$$Z_p + Z_s = \frac{R_p}{1 + sC_p R_p} + R_s$$

$$= \frac{R_p + R_s (1 + sC_p R_p)}{1 + sC_p R_p}$$

$$= \underline{(R_s + R_p) + sC_p R_p R_s}$$

$$= \frac{(R_s + R_p) + s C_p R_p R_s}{1 + s C_p R_p}$$

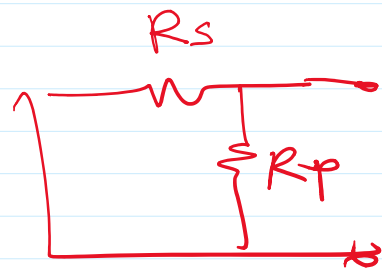
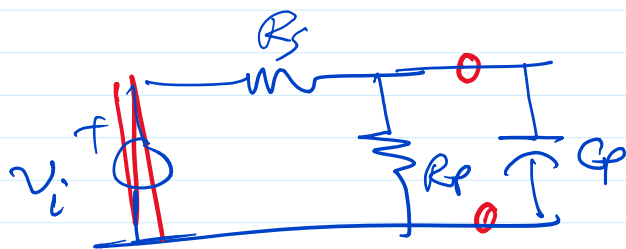
$$T(s) = \frac{Z_p}{Z_p + Z_s} = \frac{\frac{R_p}{1 + s C_p R_p}}{(R_p + R_s) + s C_p R_p R_s}$$

$$= \frac{R_p}{(R_p + R_s) + s C_p R_p R_s}$$

$$= \frac{R_p}{(R_p + R_s) \left[1 + s C_p \frac{R_p R_s}{R_p + R_s} \right]}$$

$$= K \frac{1}{1 + s \tau_p}$$

$$\tau_p = C_p \left(\frac{R_p R_s}{R_p + R_s} \right)$$



$$R_{eq} = R_s \parallel R_p$$