

$$V_{L3} = V_G - V_{S3} = V_G - I R_{S3} = V_G - g_m V_{L3} R_{S3}$$

$$\Rightarrow V_G = g_m V_{L3} R_{S3} + V_{L3} \Rightarrow V_{L3} (1 + R_{S3} g_m)$$

$$V_{L3} = \frac{V_G}{1 + g_m R_{S3}}$$

$$V_{out} = -g_m \cdot \frac{V_G}{1 + g_m R_{S3}} \cdot R_L \Rightarrow V_{out} = \frac{-g_m R_L}{1 + g_m R_{S3}} \cdot V_G$$

$$V_G = V_{in} \left( 1 + \frac{R_L}{R_1} \right) = 1 + \frac{10}{20} = 6 V_{in}$$

$$\Rightarrow V_{out} = \frac{-g_m R_L}{1 + g_m R_{S3}} \cdot 6 V_{in}$$

$$\downarrow$$

$$A = \frac{-g_m R_L}{1 + g_m R_{S3}} \cdot 6$$

$$\frac{-2 \cdot 15}{1 + 2 \cdot 1} \cdot 6$$

$$= \frac{-30}{3} \cdot 6 = -60$$