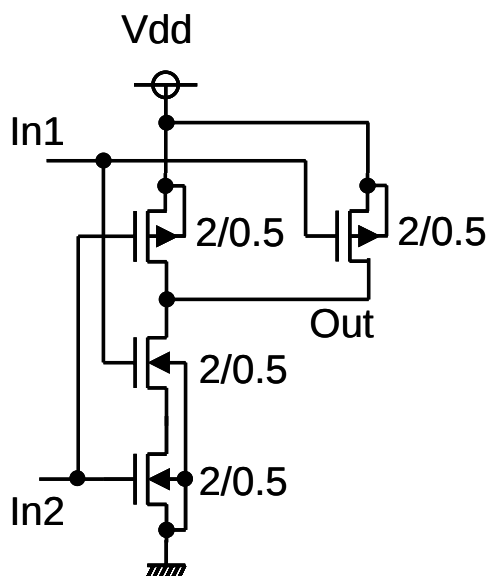
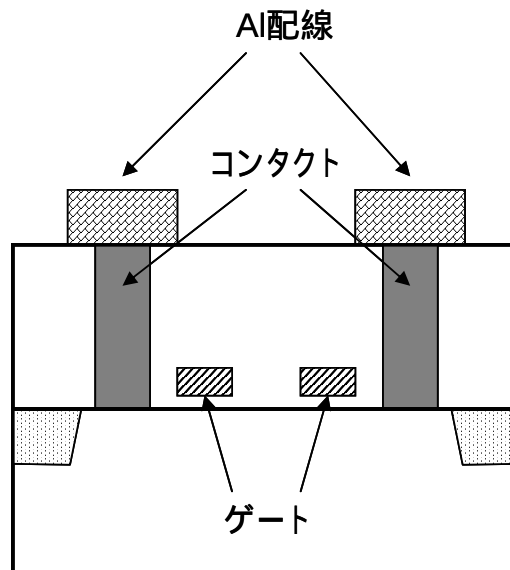


学科名 ( ) 学生番号 ( ) 氏名 ( )

(1)(2) 解答欄



(回路図)



(断面図)

(3)

$$\frac{\beta_p}{\beta_n} = \frac{W_p / L_p \times \mu_p \times C_{ox}}{W_n / L_n \times \mu_n \times C_{ox}} = \frac{\mu_p}{\mu_n} = 2$$

$$V_{inv} = \frac{V_{dd} + V_{thp} + V_{thn} \sqrt{\beta_n / \beta_p}}{1 + \sqrt{\beta_n / \beta_p}} = \frac{2.5 - 0.5 + 0.5\sqrt{2}}{1 + \sqrt{2}} = 1.12[\text{V}]$$

(4)

$$\beta_n = \frac{W_n}{L_n} \mu_n C_{ox} = 10 / 0.25 \times 200 \times 7 \times 10^{-7} = 5.6 \times 10^{-3}$$

$$\beta_p = \frac{W_p}{L_p} \mu_p C_{ox} = 10 / 0.25 \times 100 \times 7 \times 10^{-7} = 2.8 \times 10^{-3}$$

$$t_f \approx 4 \times \frac{C_L}{\beta_n V_{dd}} = 4 \times \frac{0.3 \times 10^{-12}}{5.6 \times 10^{-3} \times 2.5} = 85.7 \times 10^{-12} = 85.7[\text{psec}]$$

$$t_r \approx 4 \times \frac{C_L}{\beta_p V_{dd}} = 4 \times \frac{0.3 \times 10^{-12}}{2.8 \times 10^{-3} \times 2.5} = 171.4 \times 10^{-12} = 171.4[\text{psec}]$$

$$(5) \quad \rho_s = \frac{\rho}{H} = \frac{3 \times 10^{-6}}{0.6 \times 10^{-4}} = 5 \times 10^{-2} = 0.05[\Omega / \square]$$

$$R = \frac{L}{W} \times \rho_s = \frac{1}{0.3 \times 10^{-3}} \times 0.05 = 167[\Omega]$$