یا لطیف

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#2

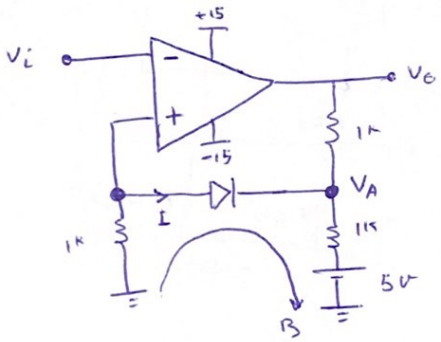
$V_{OH} = 15$

$V_{OL} = -15$

$V_D = 0.7$

الف) UTP , LTP = ?

ب) $V_o - V_i$ = ?




اگر $V_o = V_{OH}$ ⟶ D: off

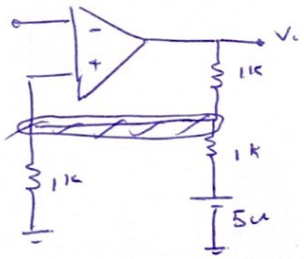
KCL in $V_i^+$: $\frac{V_i^+}{1^K} + I = 0$ *

KCL in $V_A$: $-I + \frac{V_A - V_o}{1^K} + \frac{V_A - 5}{1^K} = 0$

KVL in B: $1^K I + 0.7 + 1^K (I) + 5 = 0 \Rightarrow 2I = -5.7 = I < -2.85^{mA}$ (I)

(I) in * ⟶ $\frac{V_i}{1^K} - 2.85^{mA} = 0 \Rightarrow V_i = 2.85^V = UTP$

اگر $V_o = V_{OL}$ ⟶ D: ON ⇒




KCL in $V_i^+$: $\frac{V_i^+}{1^K} + \frac{V_i^+ - 5}{1^K} + \frac{V_i^+ - V_o}{1^K} = 0$

$\Rightarrow V_i^+ (1+1+1) = V_o + 5$

$\Rightarrow 3V_i^+ = V_o + 5 \Rightarrow V_i^+ = \frac{1}{3}(V_o + 5) \xrightarrow{V_{OL} = -15} \frac{1}{3}(-15+5) = -3.3$

= LTP