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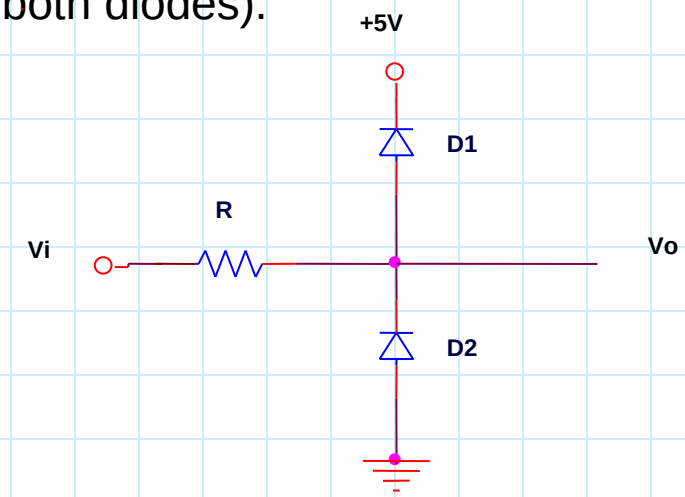
5. Given the following two-level clipping circuit, indicate the range of values that can be obtained at the output Vo. (V γ = 0.7V for both diodes).

[A] 0.7V <= Vo<= 5.7V

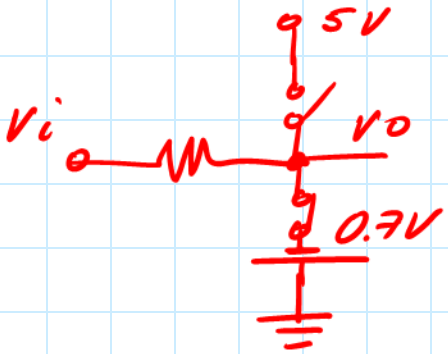
[B] -0.7V <= Vo<= 5.7V

[C] -0.7V <= Vo<= 4.3V

[D] 0.7V <= Vo<= 4.3V



$V_i < -0.7V \Rightarrow D_2$ ON D_1 OFF

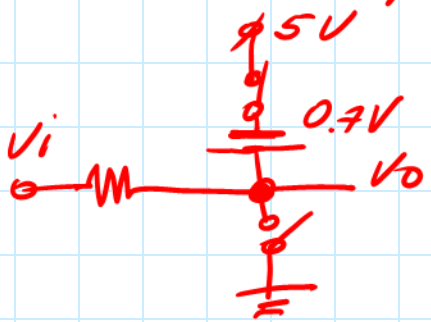


$V_o = -0.7V$

$-0.7V \leq V_i \leq 5.7V \Rightarrow D_2$ OFF D_1 OFF

$V_o = V_i$

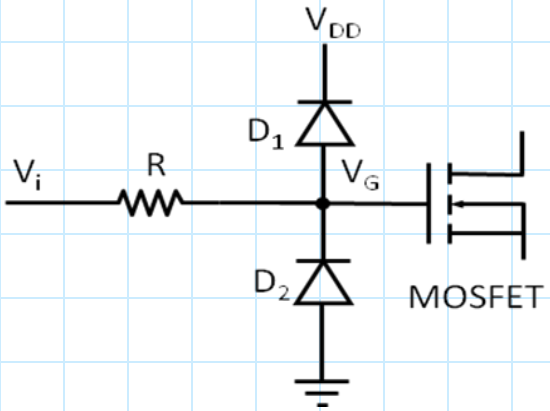
$V_i > 5+0.7V \Rightarrow D_1$ ON D_2 OFF



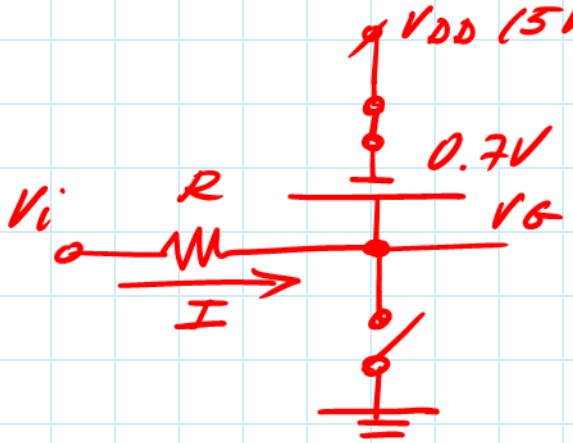
$V_o = 5.7V$

6. Given de following input-protection circuit for MOSFETs, calculate the voltages at all points and currents at all branches, and the status of both diodes, when the input is a static voltage of 4000V DC, produced when a person who has stepped on a carpet touches Vi terminal.

DATA: R = 200Ω; V_{DD} = 5V; Diodes: Vγ = 0.7V



$V_i > V_{DD} + 0.7 \Rightarrow D_1$ ON ; D_2 OFF



$V_G = V_{DD} + 0.7\,V = 5.7\,V$

$I = \frac{V_i - V_G}{R} = \frac{4000 - 5.7}{200} = 19.97\,A$

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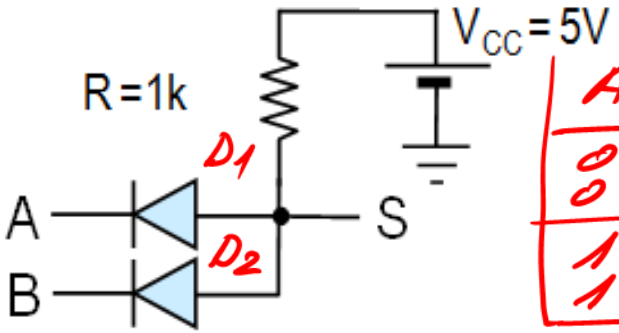
7. Given the circuit with diodes of figure and assuming A = "0" (0V) and B = "1" (5V) point out the CORRECT answer of the following, considering V_γ = 0.7V for both diodes:

[A] V_{AK} = - 4.3V for the diode of input B. ✓

[B] This circuit implements a two-input OR logic gate. ✗

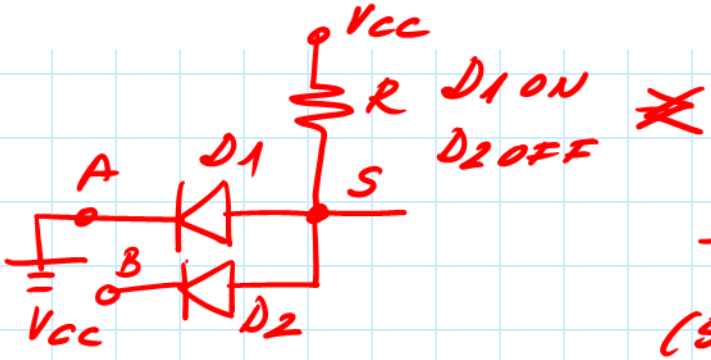
[C] The voltage at S output is 4.3V. ✗

[D] The current flowing through the resistor is divided equally in each diode. ✗

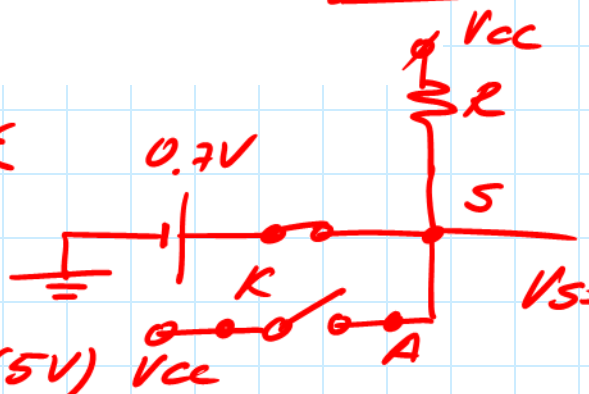


$S = A \cdot B$

A B	D_1 D_2	V_S	S
0 0	ON ON	0.7	0
0 1	ON OFF	0.7	0
1 0	OFF ON	0.7	0
1 1	OFF OFF	5	1



D1 ON
D2 OFF



$V_S = 0.7V$

$V_{AK_{D2}} = V_A - V_K = 0.7 - 5 = -4.3V$

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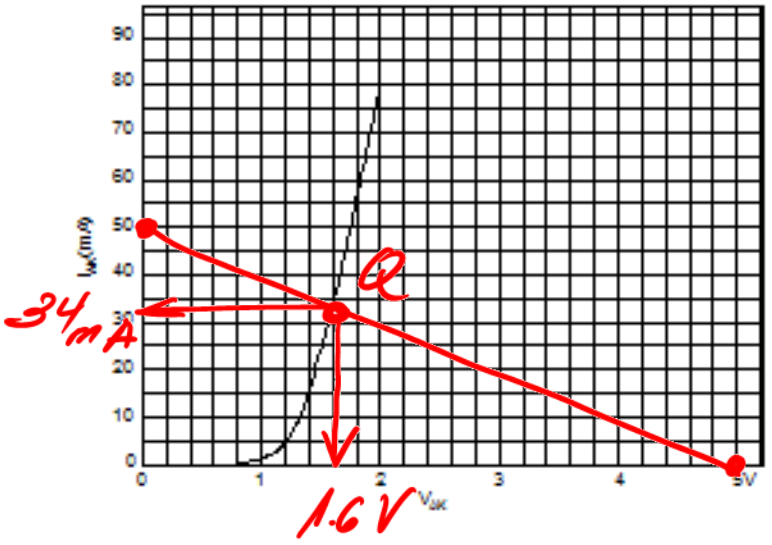
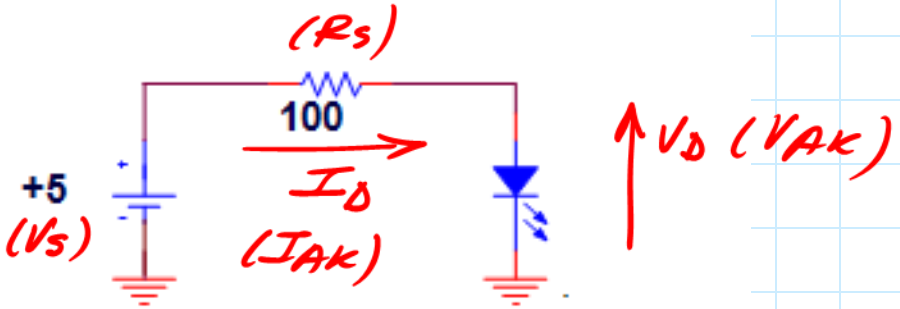
13. Indicate the operating point of LED of the following circuit whose characteristic curve can be seen on the right.NOTE: We recommend using the load line.



Load line equation:

$$I_D = \frac{V_S}{R_S} - \frac{V_D}{R_S}$$



[A] The operating point can not be calculated because of missing data.
[B] 1.4V, 15mA
[C] 1.6V, 35mA
[D] 1.8V, 55mA

Crossing points:

X axis: $I_D = 0 \Rightarrow V_{AK} = V_S = 5\,V$

Y axis: $V_D = 0 \Rightarrow I_D = \frac{V_S}{R_S} = \frac{5}{0.1} = 50\,mA$

Q (1,6 V, 34mA)