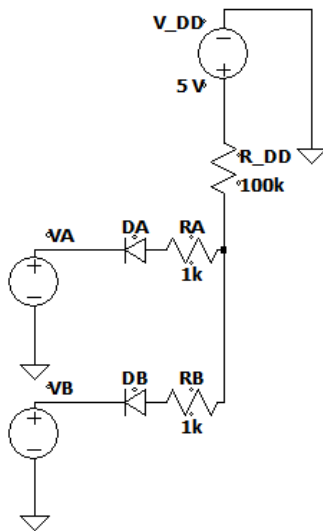


## Basic Operation

### Exercise 1



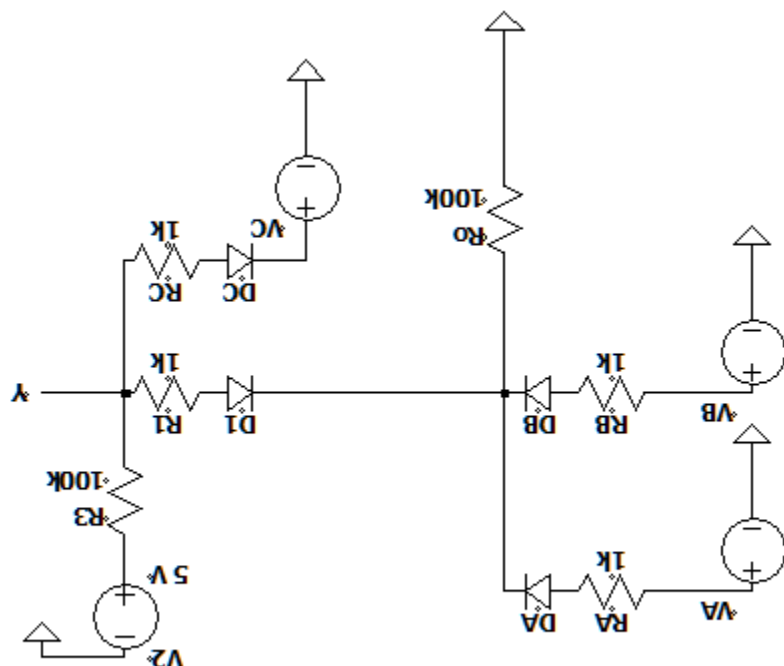
For the AND gate-

- For logic case (1,0), find the output voltage & verify your assumption of the diode model used.
- Find the current through  $R_{DD}$  for logic case (0,1).
- If  $R_B$  is doubled, find the currents through the diodes for logic case (0,0).
- Find the voltage of the node between  $D_B$  &  $R_B$  for the case in (c)

Ans: a) 0.743 V  
b) 0.043 mA  
c) 0.028 mA, 0.014 mA  
d) 0.7 V

### Practice Problem 1:

Implement the Boolean function,  $Y = (A+B)C$  using diode logic.



Ans:

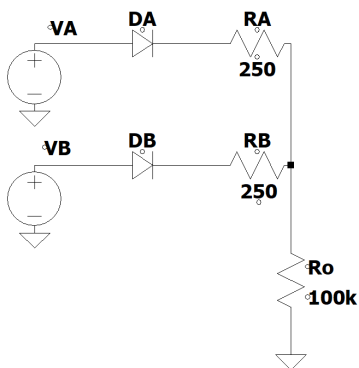
## Exercise 2

Find the lower threshold voltage for the AND gate in **Exercise 1**, so that the output logic state can be determined correctly.

Ans: 0.743 V

## Power Dissipation

### Exercise 3



Find the power dissipation for all input logic cases.

[High input = 5 V, Low input = 0.2 V]

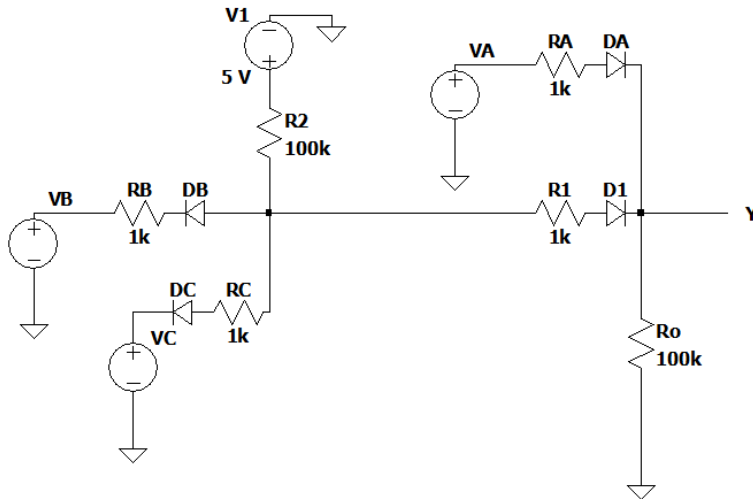
Ans: 0 mW, 2.145  $\mu$ W, 214.5  $\mu$ W, 214.5  $\mu$ W

### Practice Problem 2:

Find the maximum & average power dissipation for the OR gate in **Exercise 3**.

Ans: 21.45  $\mu$ W, 16.0875  $\mu$ W

## Exercise 4



For the diode logic circuit given-

- Find the Boolean expression of Y.
- Determine the higher & lower threshold of output voltage.
- Find the maximum & average power dissipation of the full circuit.

Ans:

$$a) Y = A + BC$$

$$b) 2.14 V, 0 V$$

$$c) 3.8 mW, 1.18 mW$$