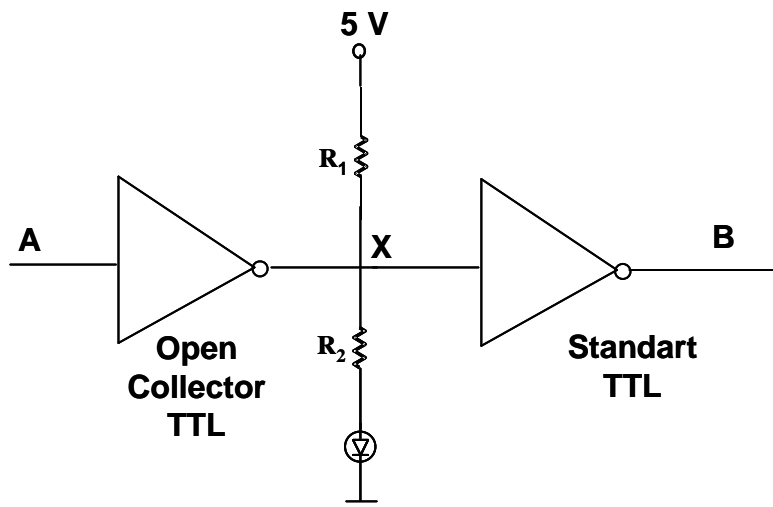# Interfacing Logic Circuits

Q1. A light emitting diode (LED) is a diode which emits light when a forward current flows through it and the brightness of the diode is a function of its forward current. Assume that the LED in the following circuit has a turn on voltage of 0.9 V and requires 1 mA to light.

Open Collector TTL
V_{supply} = 5 V
$I_{OH\ Max}$ = 250 µA
$I_{OL\ Max}$ = 20 mA
$V_{OL\ Max}$ = 0.4 V

Standart TTL
V_{supply} = 5 V
$I_{IL\ Max}$ = -2 mA
$I_{IH\ Max}$ = 250 µA
$V_{IH\ Min}$ = 2.0 V
$V_{IL\ Max}$ = 0.8 V

a) Find the minimum value of R_1 so that when the input is high, LED is off and the output B is high.
b) Find the maximum value of R_1 so that when the input is low, LED is on (i.e. LED lights) and the output B is low.
c) If R_1 = 1 kΩ and R_2 = 500 Ω, how many standard TTL loads can be connected at point X.

Q2. Find an interval for R so that the following circuit, with two open collector TTL inverters, serves as an one bit memory unit.
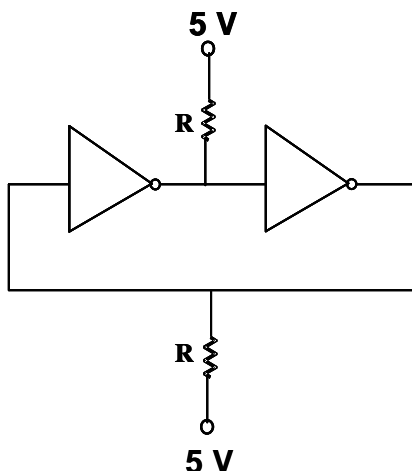
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