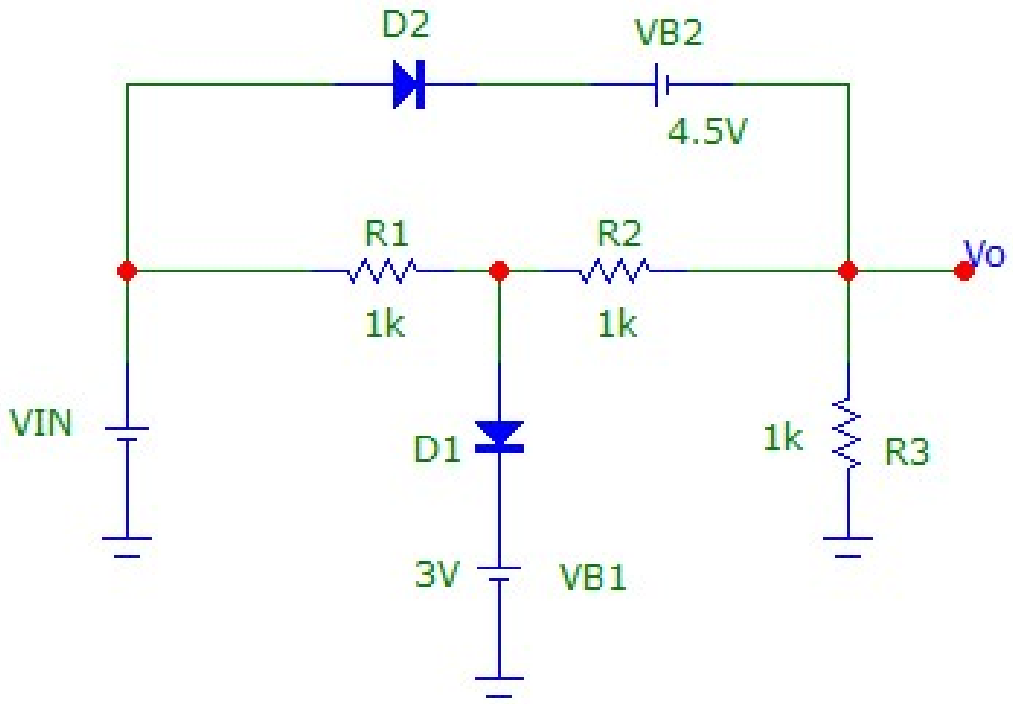
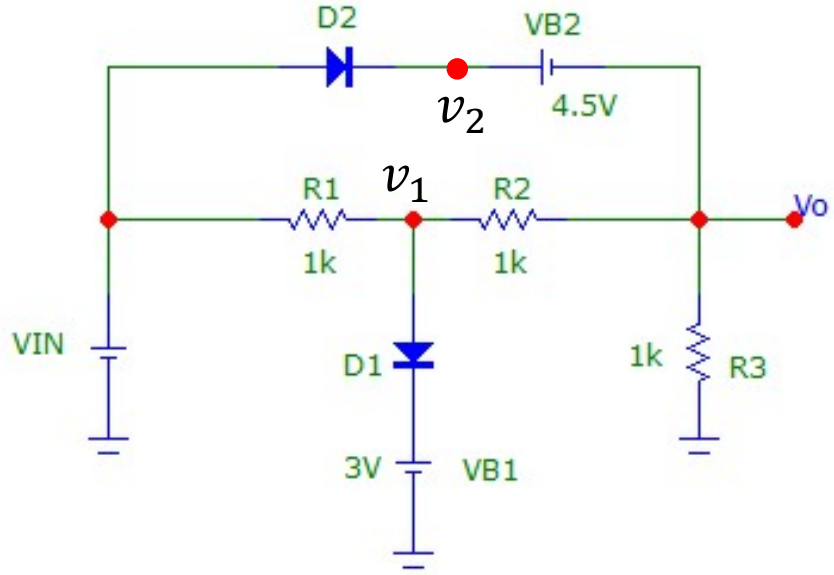
ESC201T : Introduction to Electronics

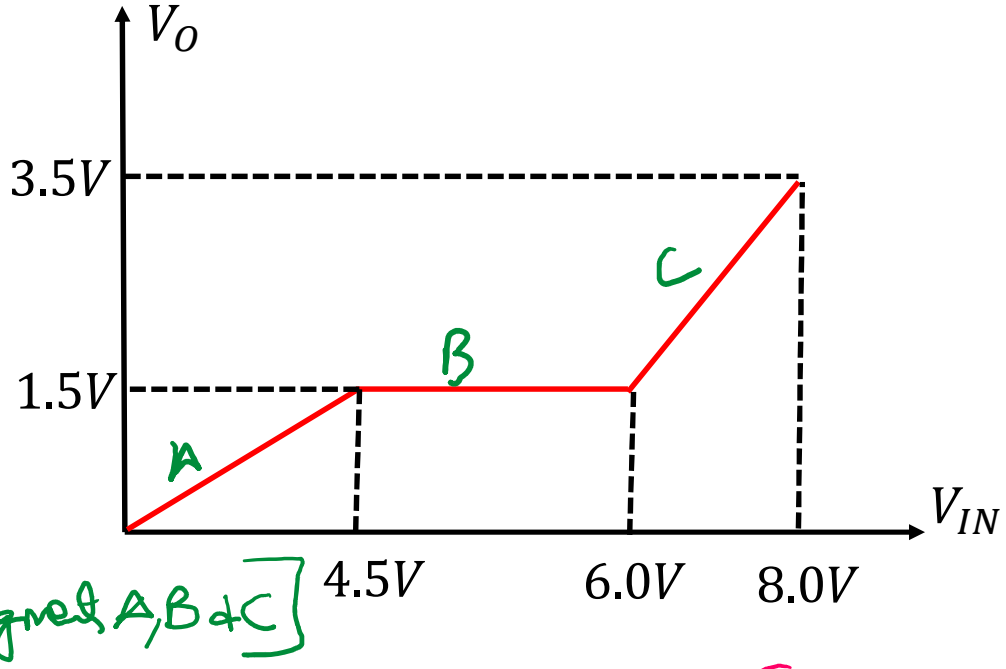
MQ4 (06/11/2020)

Q. Plot the variation of output voltage Vo vs input voltage VIN as it is increased from 0 to 8V. Assume Diodes are ideal in the sense that in forward bias, voltage drop across them is zero and in reverse bias, current through them is zero. Label (quantitatively) all threshold or corner points on x and y-axis. As usual, show steps of analysis, otherwise no marks will be awarded.

10 Marks







[V_o vs V_{in} has 3 Segments A, B & C]

A [*Initially, when* v_{IN} *is small, both diodes are OFF and* $v_O = \frac{v_{IN}}{3}$ (2)

B [*Diode D1 will turn on when* $v_1 > 3$ *or* $\frac{2}{3}v_{IN} > 3 \Rightarrow v_{IN} > 4.5V$ (2)

Once D1 turns ON, $v_1 = 3V$ *and* $v_O = 1.5V$ *independent of* v_{in} (2)

C [*Diode* D_2 *will turn on when* $v_{IN} > v_2 = 6V$ (2)

Once D_2 *turns on* $v_O = v_{in} - 4.5V$. *At* $v_{IN} = 8V, v_O = 3.5V$ (2)