United International University

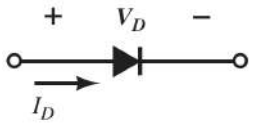
Department of Computer Science and Engineering

EEE 2123: Electronics

Mid-Term Exam: Spring 2023 Time: 1 hour 45 minutes Marks: 30

There are five questions here. Answer all of them

1. The Current $I_D = 5$ mA flows through the following diode for $V_D = 0.76$ V at 30^0 C.



Assuming the ideality factor to be unity and the turn-ON voltage to be 0.75 V at 30^0 C, calculate

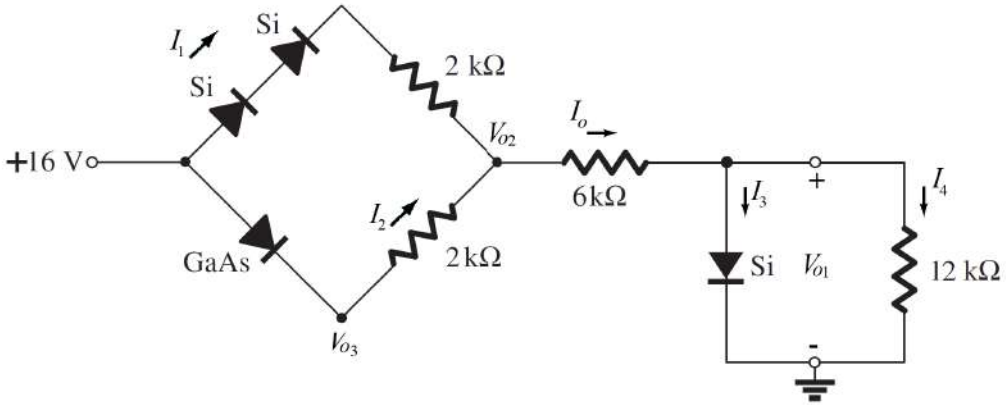
(a) the reverse saturation current at 30^0 C. [2]

(b) the diode current I_D at 343 K temperature for the same value of V_D. [2]

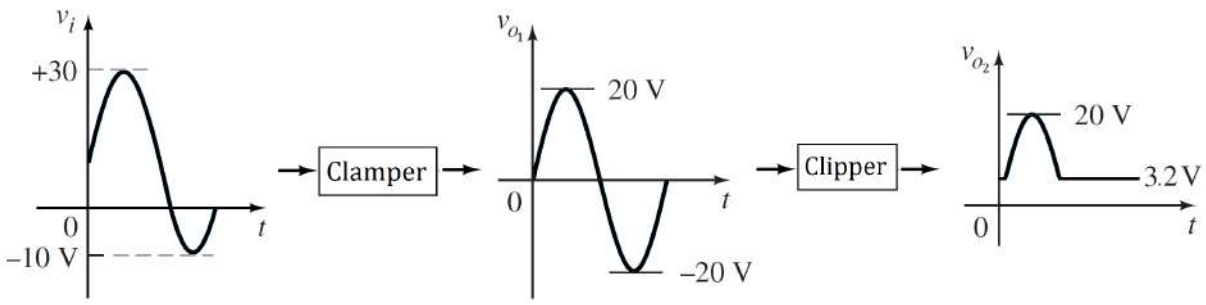
(c) the diode current I_D at 10^0 C temperature for the same value of V_D. [2]

Note that V_{ON} and I_s of a diode depend on the system temperature.

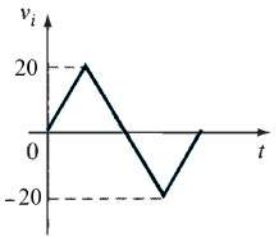
2. Calculate $I_1, I_2, I_3, I_4, I_0, V_{o1}, V_{o2}$ and V_{o3} in the following circuit: [7]

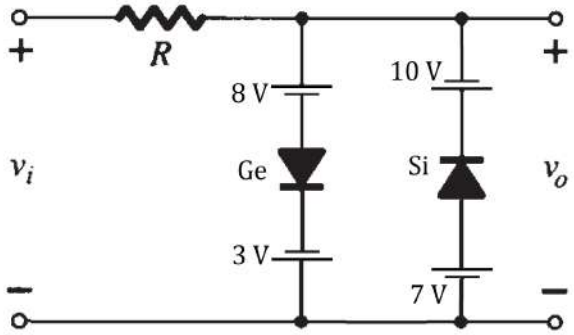


3. Design the clipper and clamper circuit to produce the following output voltage (v_{o2}) according to the given input voltage (v_i). In the following network, the input and output of the clamper circuit are v_i and v_{o1} For the clipper circuit, the input and output are v_{o1} and v_{o2}. For the clamper circuit, use **ideal** diodes/diode and for the clipper circuit, use **GaAs** diode/diodes. [6]

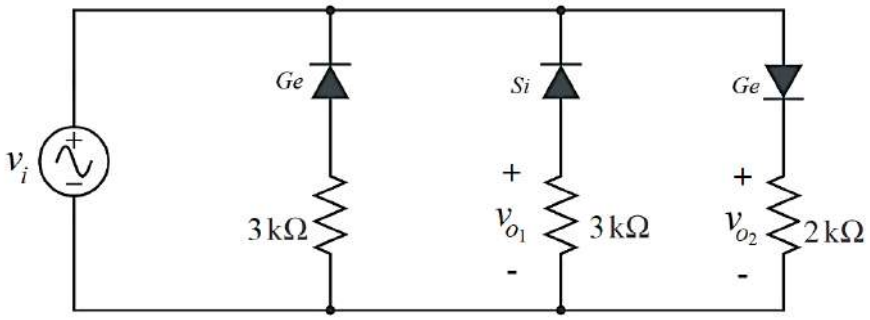


4. Sketch the output voltage (v_o) of the following circuit and properly mention the output voltage levels in your sketch. [4]





5. Consider the input voltage for the following circuit to be a sine wave with an **r.m.s** value of 10V.



(a) Draw the v_{o1} and v_{o2} profile from the circuit with proper label values. [2]

(b) Determine the difference between v_{o1}, v_{o2} and $v_{o1} + v_{o2}$ voltage graphs. [2]

(c) Determine the average voltage value of v_{o1}. [1]

(d) Determine the peak inverse voltage of both Si and Ge diodes. [2]