United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Mid-Term Exam: Trimester: Summer 2023

Course Code: EEE 2123; **Course Title:** Electronics
Total Marks: 30; **Duration:** 1 hour 45 minute

Any examinee found adopting unfair means would be expelled from the trimester/ program as per UIU disciplinary rules.

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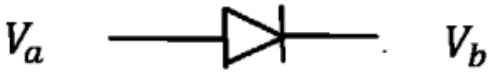
1. Suppose a diode with following specifications is operating at 40^oC.

$$I_s = 5\ nA,\ n = 2,\ V_{on} = 1.05\ V\ \&\ |V_{br}| = 4\ V$$

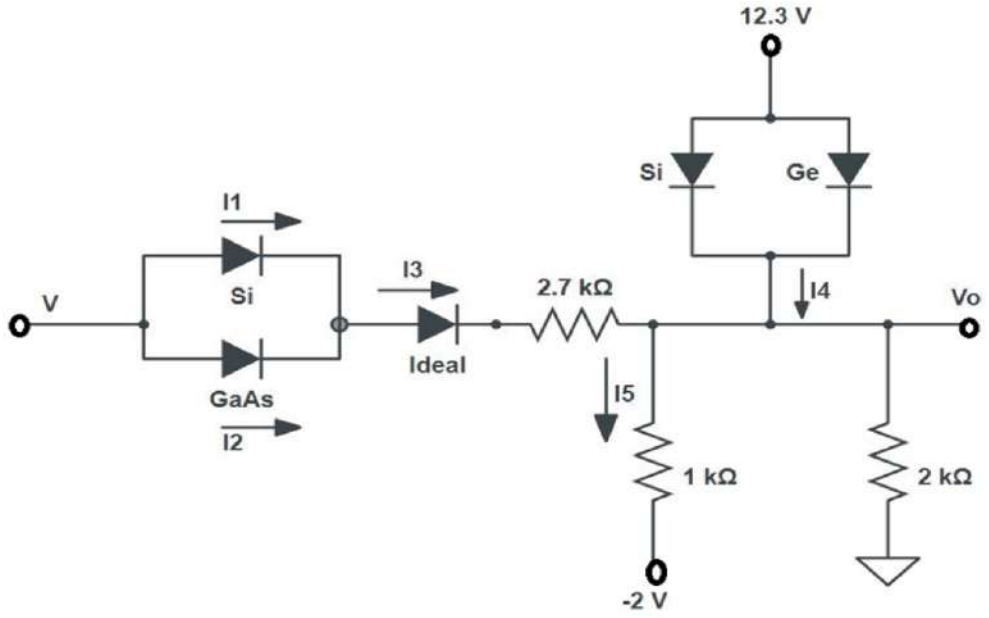


For the current listed below, fill out the following table: *[4]*

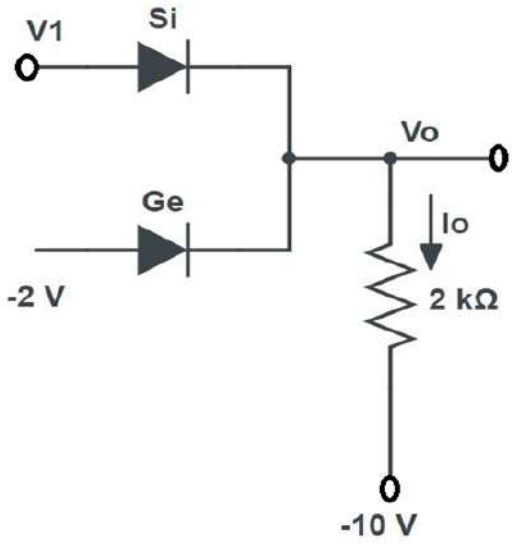
Case	Current (I_D)	Biasing type	ON/OFF/Breakdown	V_D
1	9 A (a→b)			
2	7 mA (a→b)			
3	5 nA (b→a)			
4	100 nA (b→a)			

Also draw the I/V curve of the diode and **locate the points (I_D,V_D)** accordingly. *[2]*

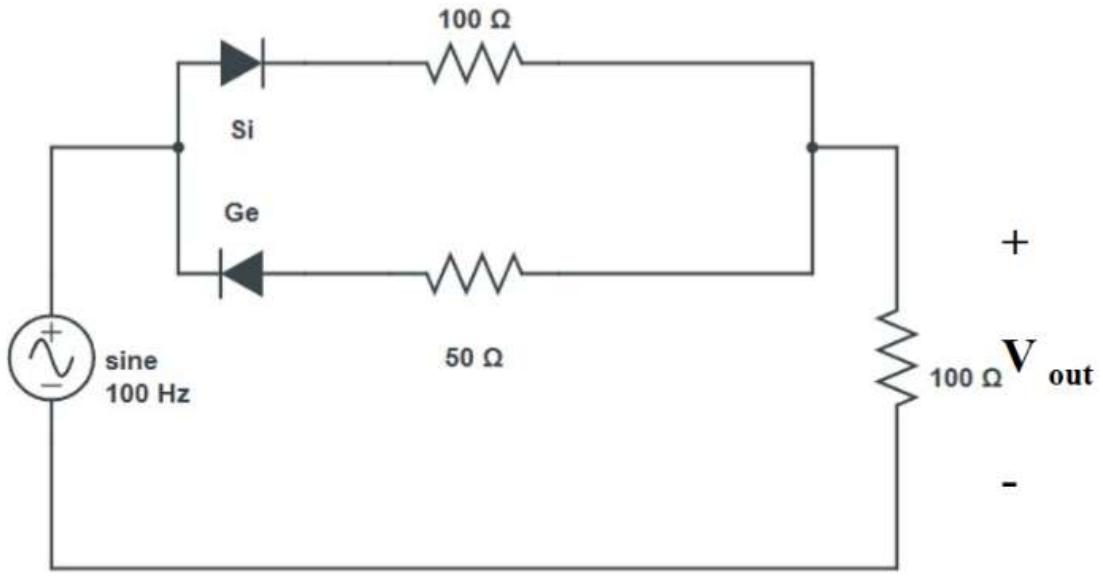
2. (a) Find the currents I_1 , I_2 , I_4 , I_5 & voltages V_o,V such that $I_3 = 1$ mA. *[7]*



(b) Can any value of $\mathbf{V_1}$ turn both the diodes on?If so, find voltage $\mathbf{V_o}$ and current $\mathbf{I_o}$. *[4]*

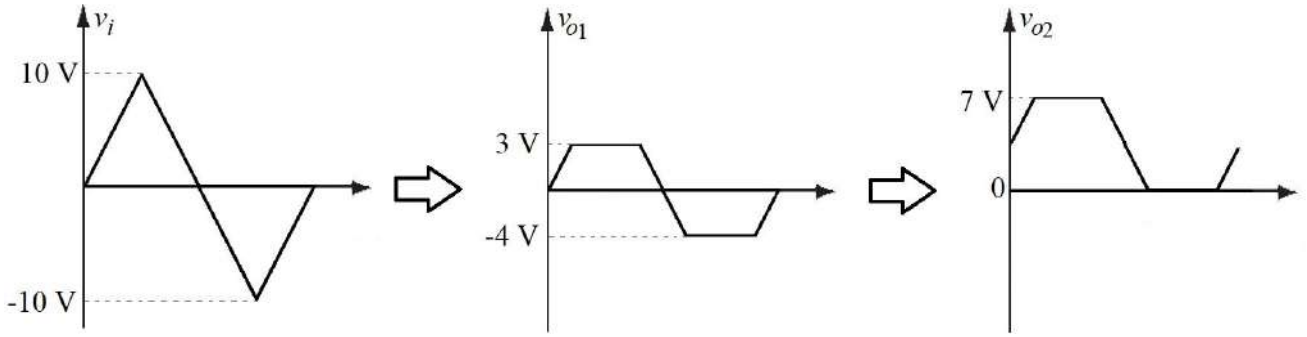


3. Consider the input voltage for the following circuit to be a sine wave with an amplitude of 10V and frequency of 100 Hz.



1) Find the time at which the Si diode starts conduction. *[2]*
2) Draw the output waveform of $\mathbf{V_{out}}$ with proper label values. *[2]*
3) Can this circuit be considered as a rectifier? Justify your answer. *[1]*

4. Design a circuit that can generate the output $\mathbf{v_{01}}$ from given $\mathbf{v_i}$. Design another circuit that takes $\mathbf{v_{01}}$ as input and gives $\mathbf{v_{02}}$ as output. Assume all diodes to be Ge throughout your design. *[3+2]*



5. For the following circuit, consider input $\mathbf{v_i}$ to be a rectangular voltage pulse with 10V peak. Derive the expression of $\mathbf{v_0}$ and sketch it with proper labeling. *[3]*