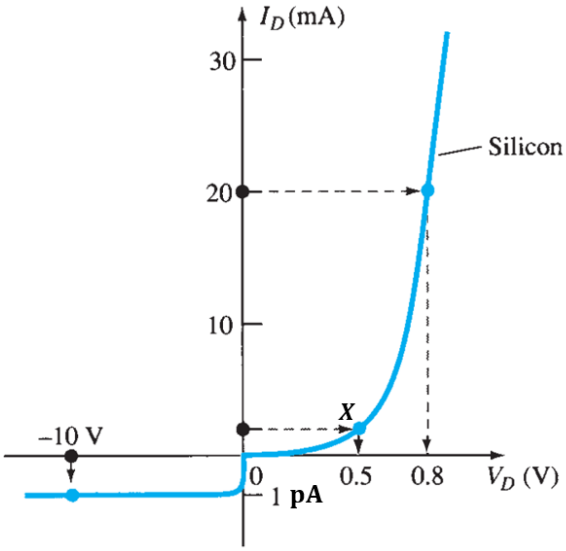
United International University
Department of CSE
CSE 2123: Electronics
Final Examination
Fall 2022

Time: 1 Hour 45 Minutes Full Marks: 30

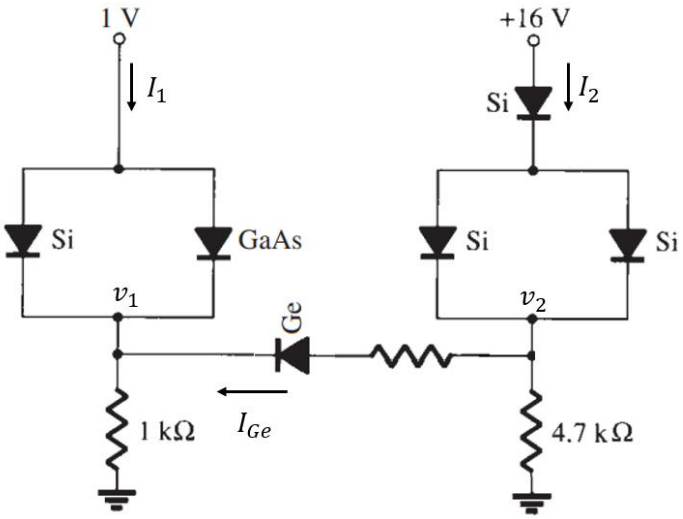
1.



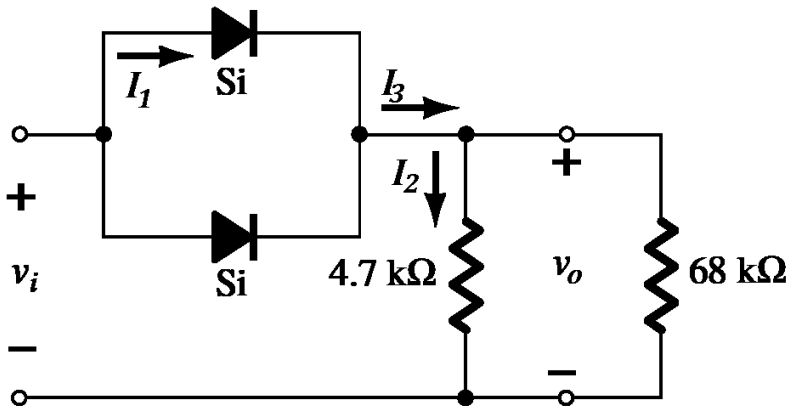
I-V characteristics of a silicon diode is shown in the above figure at temperature $\boldsymbol{T_x}$. Determine the followings:

a) The thermal voltage, V_{Tx} for $n=1$. [2]
b) The operating temperature of the diode. [1]
c) The diode current at the point $\boldsymbol{X}$. [1.5]
d) If the temperature of the diode is kept at 401K, then draw the approximate I-V characteristics on the same I-V characteristics shown in the above figure. [1.5]

2. Determine $I_{Ge}, I_1, I_2, v_1, v_2$ from the following circuit. [7]

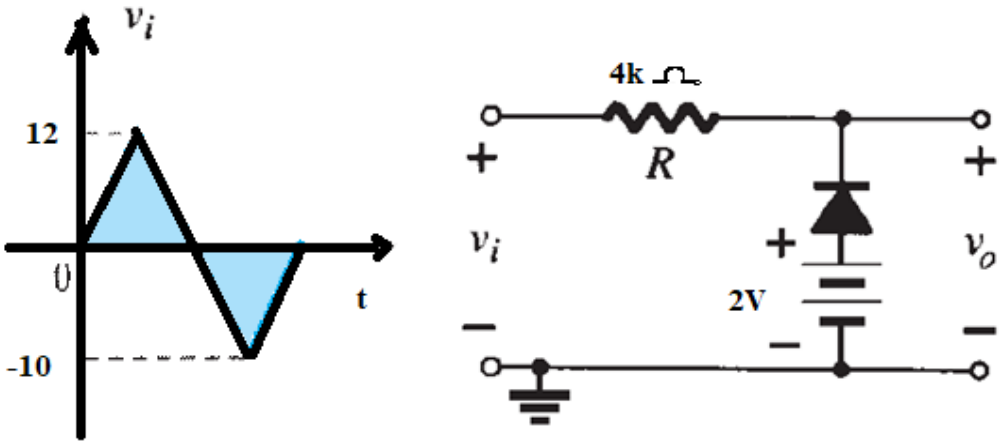


3. Consider the following rectifier circuit where the input is a sine wave, and the DC level of the output voltage is 5V:



(a) Derive the expressions of v_0, I_1, I_2, I_3 and sketch them. You must mention all peak values in the diagram. [3]
(b) Calculate the average and RMS value of the input voltage. [1]
(c) Calculate the PIV of any diode in the above network. [1]
(d) Comment on the stability of the circuit if both diodes have a breakdown voltage of 5V. [2]
(e) Compare this circuit with a full wave rectifier in case of application in rectification. [2]

4. (a) Sketch the v_o of the following circuit with proper voltage levels. Assume the diode has a turn on voltage of 1.5V. [4]



(b) Sketch the v_o of the following circuit with proper voltage levels. [4]