United International University (UIU)
Dept. of Computer Science & Engineering (CSE)
Mid-Term Examination
EEE 2123: Electronics, Trimester: Fall 2021
Total Marks: 30, Duration: 1 hour 45 minutes

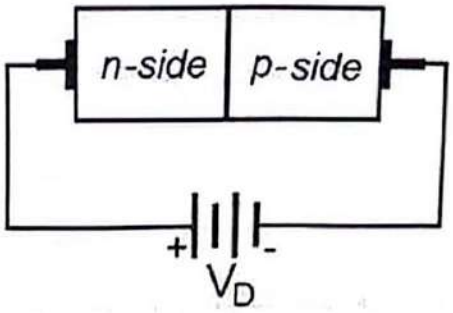
1. (a) A current of 1 mA flows through a silicon diode along $p \rightarrow n$ direction due to 1 V biasing voltage. The reverse saturation current and ideality factor of the diode are 10^{-4} nA and unity respectively. [6]

CO-1

i. Comment on the biasing type (forward or reverse) of the diode.
ii. Calculate the thermal voltage.
iii. Determine the operating temperature of the diode.
iv. What will be the new saturation current if the temperature is reduced by 20^0 C?

(b) Find the biasing of the following diode for given cases. Note that, $V_{ON} = 2\,V$ and $V_{br} = 5\,V$. Also comment on the approximate value of current in each case.

i. $V_D = 1\,V$
ii. $V_D = -1\,V$
iii. $V_D = 10\,V$
iv. $V_D = -10\,V$



2. The input voltage v_i to the following rectifier circuit is a sine-wave with 20 V amplitude. [8]

CO-2

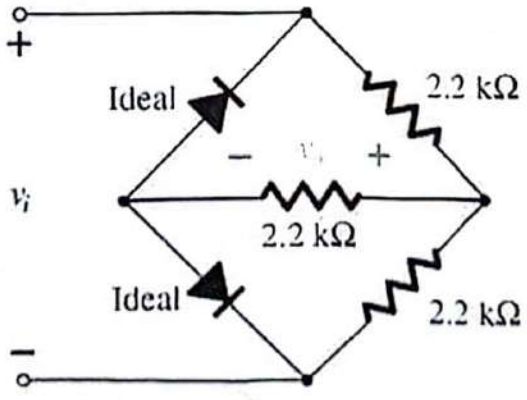
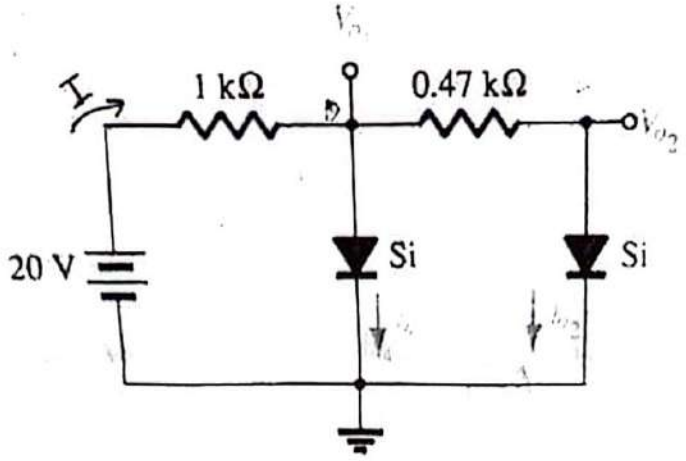


Figure for Q-2

a. Derive the expression of v_0 and sketch it mentioning the peak values in the curve.
b. What is the maximum value of v_0?
c. What is the average value of v_i & v_0?
d. Calculate PIV of any diode.
e. Based on the calculated PIV in Q-2(d), comment on the probable breakdown voltage of the diodes.

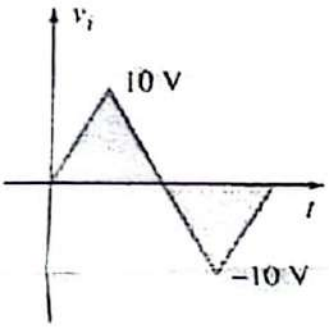
3. Find I_{01} & I_{02}, V_{01} & V_{02} in the following circuit. You must draw the equivalent circuit. [6]

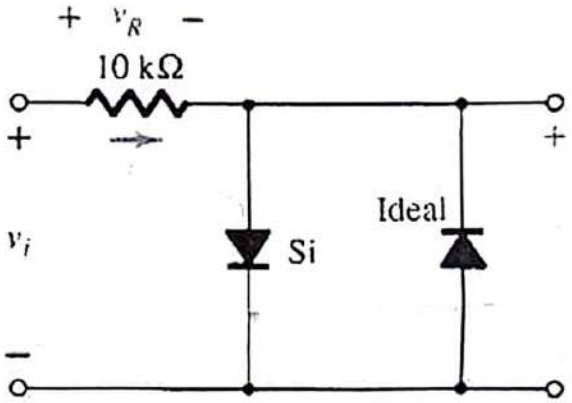
CO-2



4. Derive the expressions of v_0, v_R and i_R for the given v_i and sketch them. [6]

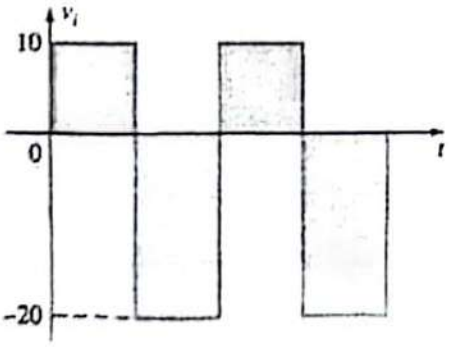
CO-2

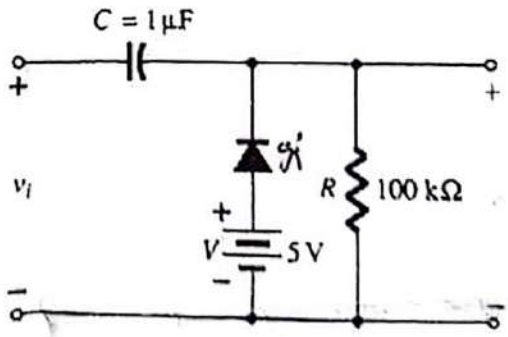




5. Sketch v_o for the following circuit mentioning peak values appropriately. [4]

CO-2





COs	Description
CO-1	Describe the operating principle of semiconductor diodes and transistors using knowledge of basic semiconductor physics
CO-2	Analyze small analog electronic circuits by applying simple lumped circuit models of diodes and transistors