United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Mid-Term Examination

EEE 2123: Electronics, Trimester: Spring 2022

Total Marks: 30, Duration: **1 hour 45 minutes**

1. (a) The reverse saturation current I_S of a particular diode is found to be $2\ nA$ at 10^0C. Find the temperature at which this current would be increased to $32\ nA$? [2] [8]

CO-1

(b) Does temperature affect the turn-on (cut-in) potential of diodes? Explain in brief. [2]

(c) Suppose a diode with following specifications is operating at 35^oC. [4]

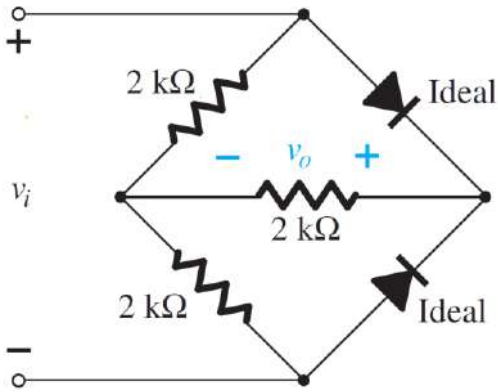
$$I_s = 6\ nA, n = 1, V_{ON} = 2\ V\ \&\ |V_{br}| = 3\ V$$

Calculate the amount of voltage that should be applied across this diode to obtain a current of

i. $5\ mA$ ($p \rightarrow n$ direction)
ii. $0\ mA$ ($p \rightarrow n$ direction)
iii. $6\ nA$ ($n \rightarrow p$ direction)

2. For the following rectifier circuit, $V_{i,RMS}$ is found to be $25\sqrt{2}\ V$. [8]

CO-2



(a) Derive the expression of v_0 and sketch it. You need to mention the peak values in your graph. [3]

(b) Calculate PIV of any diode. [1]

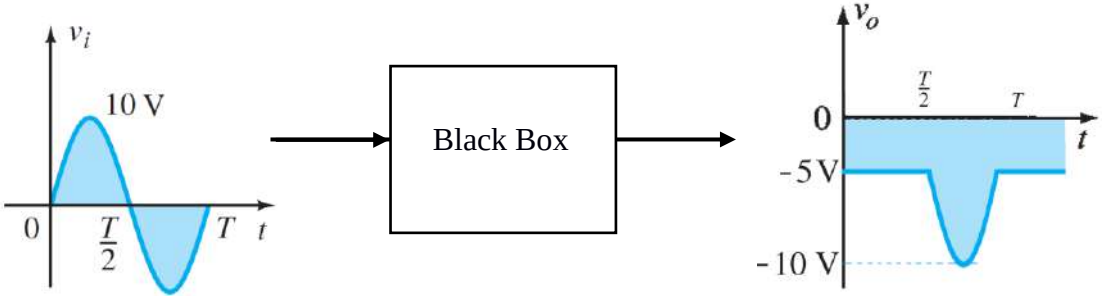
(c) Find the average of value of both v_i and v_o. [1]

(d) Comment on the range of breakdown voltage of the given diode with necessary explanation. [1.5]

(e) Can this circuit be considered as a clipper? Explain in detail. [1.5]

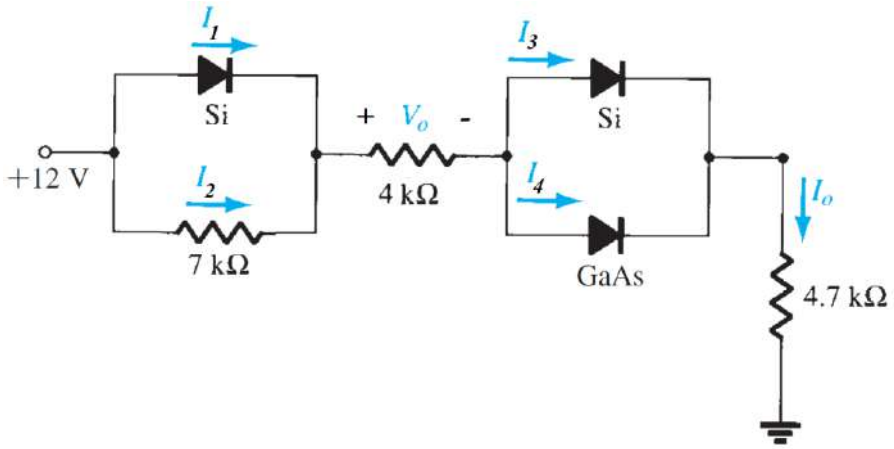
3. The black box contains a clipper circuit that generates the output voltage (v_0) shown in the figure below. From the given pattern of v_i and v_0, design the clipper circuit. Assume all diodes to be ideal. [5]

CO-2



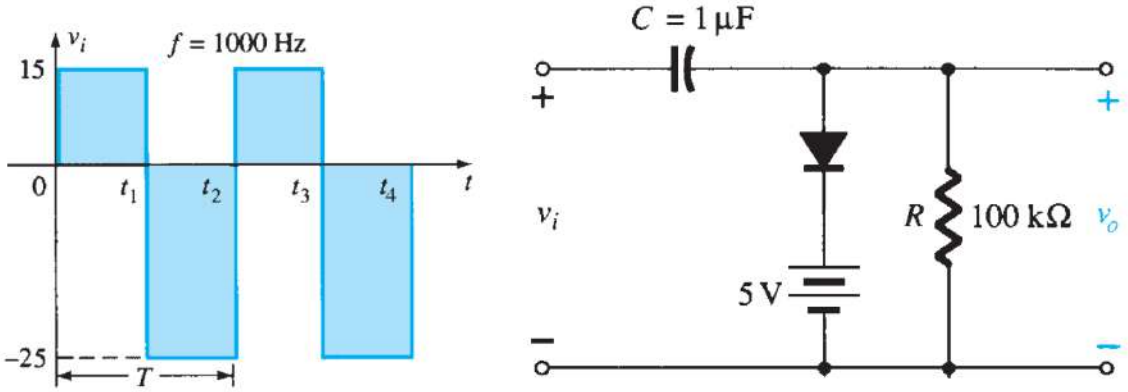
4. Find I_1, I_2, I_3, I_4, I_0 & V_0 in the following circuit. You must draw the equivalent circuit. [5]

CO-2



5. Sketch v_o for the following network mentioning peak values appropriately. Assue that the diode has cut-in (turn-on) voltage of 2.1 V. [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