Analog Electronic Circuits (EC2.103) : Quiz-1
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Date : 3rd April, 2023, Duration : 45 minutes, Max. Marks : 10

Instructions:
- Clearly write your valid assumptions (if any)
- Numerical answers must be correct upto **two places** of decimal to get any credit
- Refrain from copying
- You can use your lecture notebooks and own handwritten short notes in the exam hall
- Mobile phone, computers can not be used during exam

1. For the circuit shown in figure 1, find values of I_x, V_1 and V_2 correct upto two places of decimal at room temperature. It is given that D_1 and D_2 are identical diodes. The reverse saturation current of diode is $I_0 = 5 \times 10^{-15}$ A and $V_T = 25$ mV at room temperature. [3 Mark]

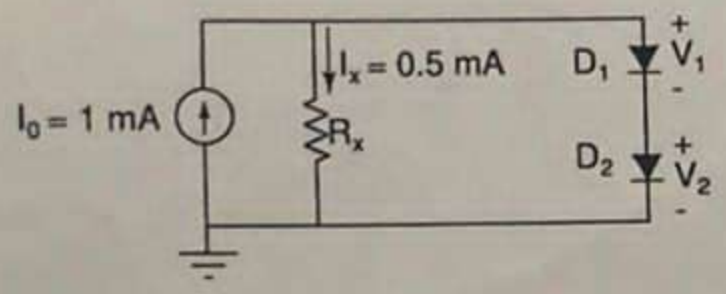

Figure 1

2. For the circuit shown in figure 2(a), it is given that $R_1 = 10\ M\Omega$, $C_1 = 2\ pF$, $R_2 = 5M\Omega$ and $C_2 = 50\ pF$. As shown in figure 2(b), an input step voltage V_{IN} is applied to the circuit. As shown in the figure, V_{IN} changes from $V_1 = 1$ V to $V_2 = 2$ V in $t_r = 10$ ps time. Find the values of $V_{C1}(t = 0-)$, $V_{C1}(t = 0+)$ and $I_{C1}(t = 0+)$. [3 Mark]
(Hint: You can assume t_r is very small and from $t = 0$ to $t = t_r$ all current flows through capacitors only. $I = Cdv/dt$)

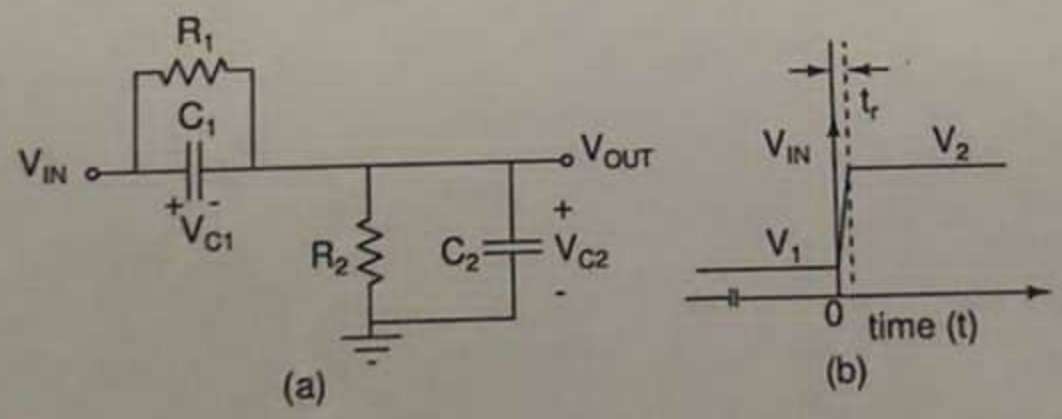

Figure 2

3. Find $V_{C2}(t)$ as a function of time for the circuit given below in Fig. 3. Assume that C_2 was completely discharged at $t = 0^-$. [2 Mark]

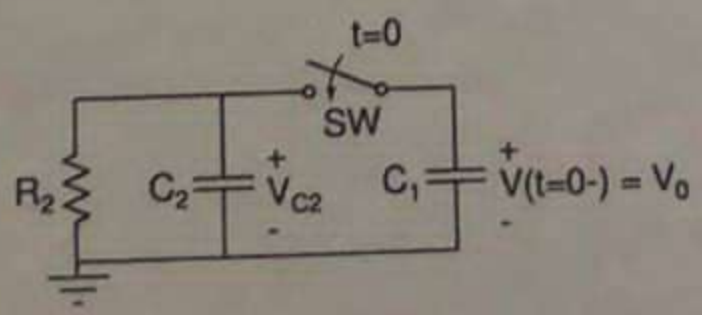

Figure 3

4. For the circuit shown in figure 4, plot voltage transfer characteristic (V_{OUT} vs V_{IN}) considering ideal diodes. Also plot $V_{OUT}(t)$ as a function of time for $V_{in} = 20cos(\omega_0 t)\ V$. Clearly label axis and values on all plots to get any credit.
[2 Mark]

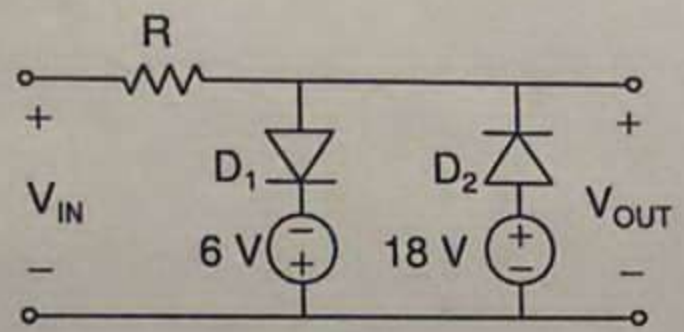

Figure 4

Good luck !!