VE311 Electronic Circuit Homework 2

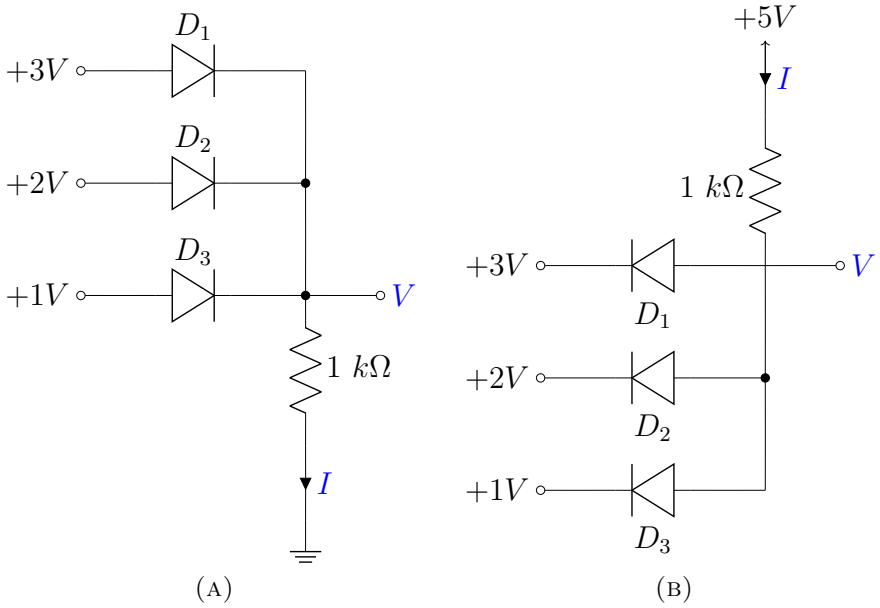
Due: **June 4th**

Note:

1) Please use A4 size paper or page.
2) Please clearly state out your final result for each question.
3) Please attach the screenshot of Pspice simulation result if necessary.

Question 1. Diode Circuit Exercise 1

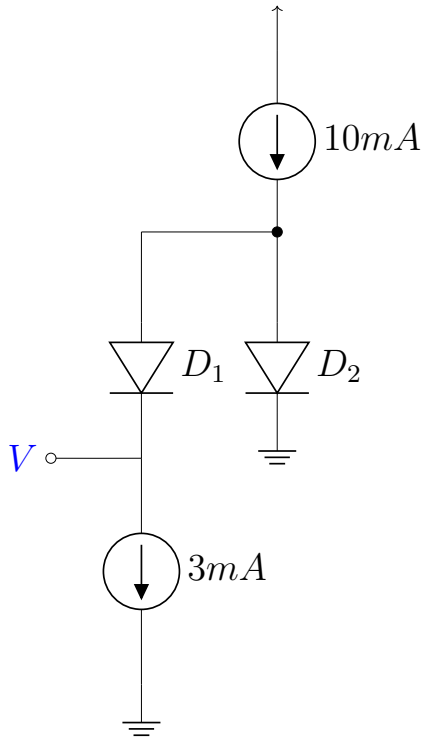
Find the values of I and V in the circuits shown below.



(A) (B)

Question 2. Diode Circuit Exercise 2

In the following problem, D_1 has 10 times the junction area of D_2. What value of V results? To obtain a value for V of 60mV, what current I_2 is needed.



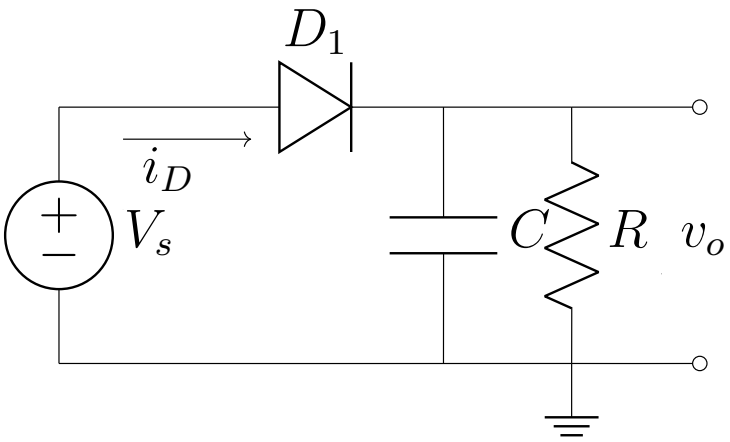
Question 3. Voltage Regulator

A voltage regulator consisting of two diodes in series fed with a constant-current source is used as a replacement for a single carbon-zinc cell (battery) of nominal voltage 1.5 V. The regulator load current varies from 2 mA to 7 mA. Constant-current supplies of 5 mA, 10 mA, and 15 mA are available. Which would you choose, and why? What change in output voltage would result when the load current varies over its full range?

Question 4. Half-Wave Rectifier

Design a half-wave rectifier circuit, such as below, which can convert a sinusoidal voltage input, $V_{\mathrm{s}} = 5\sin(2\pi 100 \cdot \text{ time})$, to an almost constant voltage output.

1) Assuming $\mathrm{V_{on}}$ = 0.9 V and R = 100Ω, calculate C which makes the ripple voltage (V_r) is smaller than 0.1 V. Estimate $V_{dc}, I_{dc}, \theta_c, \Delta T, I_{\mathrm{peak}}, I_{\mathrm{surge}}$ and PIV of the designed half-wave rectifier.
2) Plot $\mathrm{V_s}$ and $\mathrm{V_{out}}$ versus time on the sample graph.



Question 5. Full-Wave Bridge Rectifier

Design a full-wave bridge rectifier circuit, such as below, which can convert a sinusoidal voltage input, $V_s = 5\sin(2\pi 100 \cdot \text{time})$, to an almost constant voltage output.

1) Assuming $V_{on} = 0.9$ V and R = 100Ω, calculate C which makes the ripple voltage (V_r) smaller than 0.1 V. Estimate $V_{dc}, I_{dc}, \theta_c, \Delta T, I_{peak}, I_{surge}$ and PIV of the designed full-wave bridge rectifier.
2) Plot V_s (using "voltage differential marker" function) and V_{out} versus time on the sample graph.