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ECE 0257 Quiz #4 Reflection

You should have received an email containing a link to your submission for quiz #2.

Instructions

- Briefly review your quiz
- Use SPICE to model and simulate the problem
- Based on the simulation results, re-examine / re-solve the problem and try to identify where you made a mistake, gaps in your knowledge or new insights you gain from simulating the problem
- Fill out the worksheet on the following pages.

Grading

- 50% of your overall score for this quiz will be determined by your original in-class performance
- The remaining 50% of your score will be determined by the responses you submit on this worksheet

PLEASE NOTE: This quiz problem contained very specific ZENER diode parameters ($V_z = 6.4 \text{ V}$ @ $I = 20 \text{ mA}$). Thus, some extra steps are needed in order to accurately model the circuit. We are going to use a generic Zener diode and modify the parameters to match the problem we were given.

In your schematic, open up the “Breakout” Library and place the “DbreakZ” component. This is the Zener diode.

To see/modify the diode parameters, right click on the component and select “Edit PSPICE Model”

We need to make 3 modifications to the generic Zener model in order for it to match the problem you were given:

- We need to model the dynamic resistance that was specified in the problem. We can do this by setting the series Resistance (R_s) to 20 Ohms
- BV (Breakdown Voltage) corresponds to V_{z0} . To model the circuit in this problem V_{z0} should be at 6V.
- The Current (I_{BV}) that corresponds with the breakdown voltage is 20mA.

After making these modifications to the diode, the model should read as follows

```
.model Dbreak D Is=1e-14 Cjo=.1pF Rs=20 BV=6.0V IBV=20mA
```

Save the model, reconstruct the circuit and use it to reevaluate your work.



Final Answers

Problem #1

6.67 V

Problem #2

166 mV/V

*One way to simulate these problems is to perform a DC bias point analysis. If it appears that the voltage/current annotations are not updating after running simulation experiments, then close your schematic, re-open it and toggle the voltage/current markers ( and ) off and then back on. Alternatively, solutions can also be explored via transient and DC analyses. **In many instances, this proves to be more reliable.**

*Note, there may be slight differences between your final responses and numerical values that you determined via simulation. The final responses indicated above should represent results from hand calculations.

Being able to analyze your quiz and reflect on your thinking process is an essential part of learning.

- **If the answers you entered above are different in any way from the answers you provided on your original quiz submission, then please provide an explanation by answering the questions on the following page**
- **If re-examining the quiz did not result in you gaining new insights about the problem, identifying mistakes, or gaps in your knowledge then enter n/a in the boxes below.**

Explain the source of any differences between your quiz responses or calculations and the simulated results.

Problems involving the Zener diode seem to feel non-deterministic, as there isn't really a way to get to an answer without having an immediate intuition as to what's happening in the circuit. That is why I feel like I struggled on this quiz; I did not have the necessary intuition to solve the problem at first glance. When I attempted to walk through the first problem, for example, I did not know when to use the source voltage and when to ignore it.

How can you use this comparison experience to improve in the future?

I'm more aware of how Zener diodes and voltage sources interact, so I'm better able to understand what's going on in those types of problems.