Experiment 8 Handout
ECE203 SS25

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Answer questions and turn these pages in to your TA at the end of your lab period.

Section 5.2

10. Why isn't there any current? There is no load part, only one voltage

13. Node 2 voltage = 59.5489 V.

14. Power = $I^2R = (1.8045 \cdot 10^{-4})^2 \cdot (10^6) = 32.56\,mW$.

    Will a 0.125W resistor work here? Yes. $32.56\,mW < 125\,mW$

15. 330kOhm current 1.8045×10^{-4} A.

    Is it the same as the 1MOhm? it is the same

    Should it be? Yes. Because they are in Series

18. 330kOhm current 1.445×10^{-4} A.

    How does it compare to above?

    It decrease

    How does this explain the change in voltage at node 2?

    Because Capacitor stores some charge

19. Does the capacitance matter? Explain.

    No. it does not affect. Because it's DC. open circuit

22. Does the 10MOhm probe make a difference? Why or why not?

    Yes. it makes difference. It now V(2) = 58.107 V. it drain less

Section 5.3

9. Explain the shape difference

Node 2 Connect to CS & RS. Charging need a time $\tau = RC$. So V(2) need some time to achieve. it curved a bit. V(1) is a sharp leap.

10. Time constant estimation 2.5 µs

13. Average value and width of the current pulse.

    Estimated change in voltage.

    Average: 100 µA
    width: 6 µs

$\Delta V = \frac{I}{C} \cdot \Delta t = \frac{100\,\mu A}{10\,PF} \cdot 6\,\mu s = 60\,V.$

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14. How would we charge this capacitor faster? What part of the circuit would we change?

less resistance Smaller R_1 R_2 / Smaller Capacitor.

15. Estimated cutoff frequency f_c = 1/(2*pi*time constant)

$$f_c = \frac{1}{2\pi(2.5\mu)} = 63\,kHz$$

Would this work with a 50kHz square wave?

Yes. 50kHz < 63kHz., but Some parts might not work well

What about a 60Hz sinusoid?

Yes 60Hz ≪ 63kHz. It will work well

20. RMS voltage = 58.17V

21. Is there a phase delay or amplitude change?

Yes. 1.8 V amplitude change

Section 5.4

5. Are nodes 2 and 3 the same voltage? Should they be?

Yes. They should be because we are doing ideal op-amp

6. Are nodes 1 and 4 the same voltage? Should they be?

No. Similar but not same. Because phase and filter. they should not be

Section 5.5

5. Did your AC sweep work correctly? Yes

Section 5.6

7. Did you get the odd behavior you saw in the lab? Yes