

Q1

Q1 Say we are tasked with designing a 5V, 2A regulated power supply. We chose the Zener diode circuit to do this with an input power supply that can go from 6 to 9 V. Assume the Zener chosen has a 10mA minimum current for the Zener effect. What should be the specifications for the Zener and the series resistor?

[10 marks]

Q2. Accelerometers are made using a capacitive structure with a movable plate. Refer to the structure shown in the figure. Initially, the plate is in the middle ($x = 0$). If the middle plate moves vertically by x , what is the equivalent capacitance of the system with respect to the initial capacitance of the system (C_0)? Make a rough plot of C/C_0 with x . Assume plate area is the same in all cases. Ignore fringe capacitance effects. Assume $x \ll$ linear dimensions.

A

B

d

Q3

Q3. Create the Thevenin equivalent circuit for the circuit given below:



[10 marks]

Q4

Q4. Find the equivalent resistance of the Deathly Hallows symbol, between A and B. All resistors are R .

A

[10marks]