TUTORIAL SHEET NO. 1

(Diode Equation, Effect of temperature on reverse current, diode resistance)

Q1. The current flowing in diode is $2x10^{-7}$A at room temperature when a reverse voltage is applied. Calculate current through diode when a forward bias of 0.1V is applied across diode at room temperature. *Answer: 1.16μA*

Q2. At room temperature current flowing in a p-n diode is 0.5mA at 340mV and 15mA at 440mV. Calculate value of η for the same. *Answer: 1.1*

Q3. A germanium diode carries a current of 1mA at room temperature when a forward bias of 0.15V is applied. Calculate reverse current for the same. *Answer: 3.13μA*

Q4. Find the increase in temperature necessary to increase reverse current by a factor of 100. *Answer: 66.4°C*

Q5. For what diode terminal voltage the reverse current of a Ge diode reach 99% of it saturation value at 300°K temperature. *Answer: -0.119V*

Q6. At room temperature current through a germanium diode is 5mA at 0.35V. Predict the diode current if applied voltage is 0.4V. *Answer: 34.19mA*

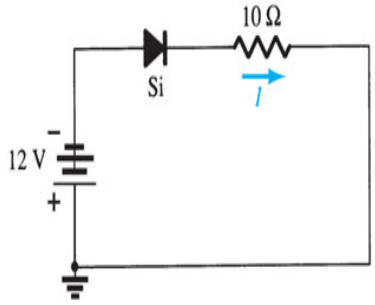
Q7. Find increase in forward bias voltage that doubles the forward current through a silicon diode at room temperature. *Answer: 36.04mV*

Q8. An ideal Ge diode at a temperature of 125°C has a reverse saturation current of 30μA. Calculate dynamic resistance for a 0.2V bias (i) Forward bias (ii) Reverse bias condition. *Answer: 3.36Ω, 0.389MΩ*

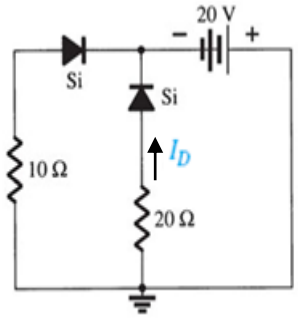
Q9. Find the static and dynamic resistance of a Ge diode if the temperature is 27°C and reverse saturation current is 1μA for an applied forward bias of 0.2Volt. *Answer: 91.32Ω, 11.86Ω*

Q10. Determine the diode current at 20°C for a silicon diode with *Is* =50 nA and an applied forward bias of 0.6 V. *Answer: 8.13mA*

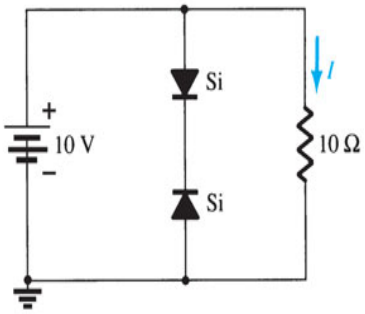
Q11. Determine the current *I* for each of the configurations using the approximate equivalent model for the diode.



Answer: 0A

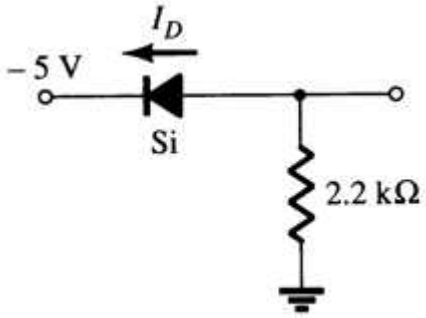


Answer: 0.965A

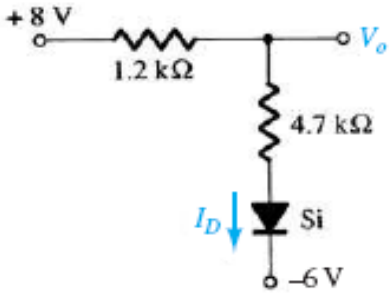


Answer: 1A

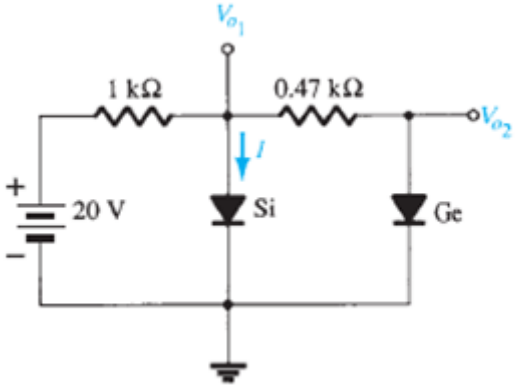
Q12. Determine V_o and I_D for the networks



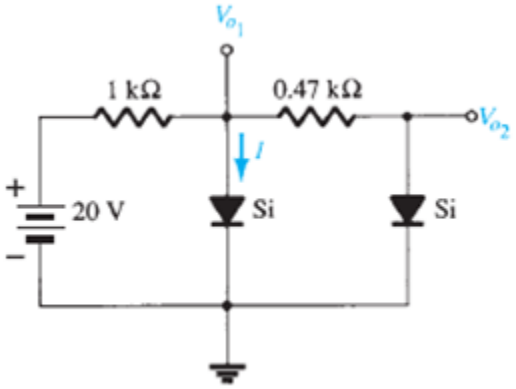
Answer: -4.3V, 1.95mA



Answer: 5.3V, 2.25mA

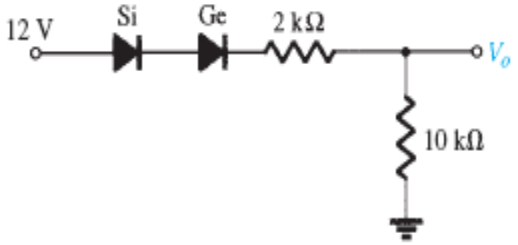


Answer: 0.7V, 0.3V, 18.45mA

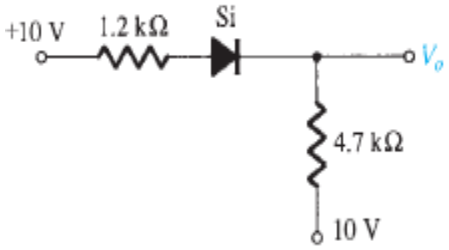


Answer: 0.7V, 0.7V, 19.3mA

Q13. Determine the level of V_o

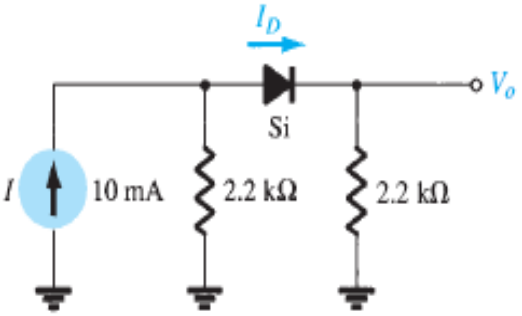


Answer: 9.17V

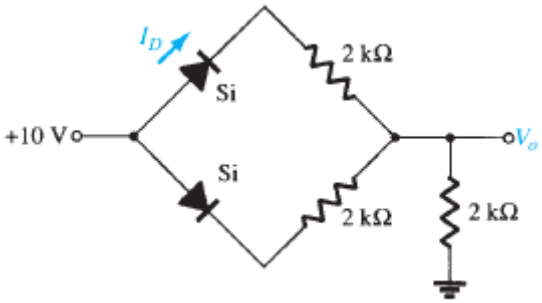


Answer: 10V

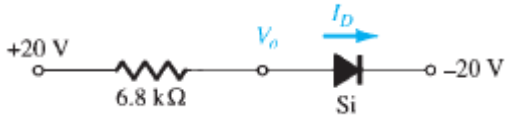
Q14. Determine V_o and I_D for the networks.



Answer: 7.512V, 6.26mA

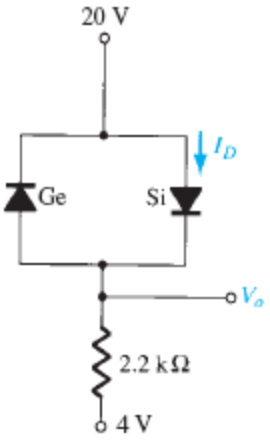


Answer: 7.14V, 1.55mA

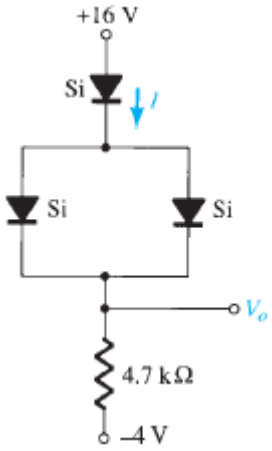


Answer: -19.3V, 5.77mA

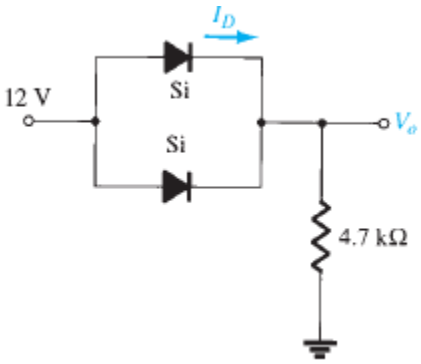
Q15. Determine *Vo* and I_D for the networks



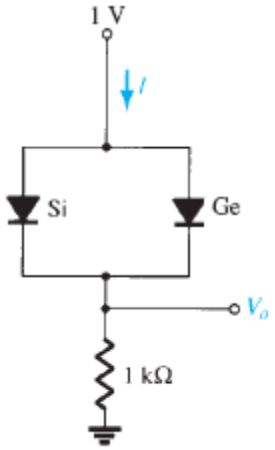
Answer: 19.3V, 6.95mA



Answer: 14.6V, 3.957mA



Answer: 11.3V, 2.4mA



Answer: 0.7V, 0.7mA