Ministry of Higher Education
King Fahd University of Petroleum & Minerals
Electrical Engineering Department

وزارة التعليم العالي
جامعة الملك فهد للبترول و المعادن
قسم الهندسة الكهربائية

Major Exam # 1 Electronics I EE 203

Name	
ID#	

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Problem #1	
Problem # 2	
Problem # 3	
Total Grade	

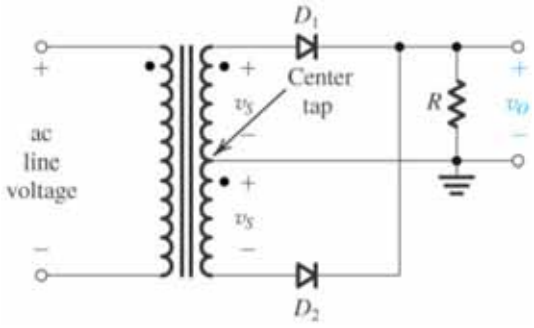
Problem # 1 (10) points

Assume that diodes need 0.7V to conduct.

(a) For the rectifier shown below, if V_s is sinusoidal with amplitude of 15V and frequency of 60Hz. Calculate the peak inverse voltage (PIV). **[2 points]**

(b) If smoothing capacitor is added in parallel with R, design the rectifier to produce an output DC voltage of 12V with a ripple of not more than 0.6V. Assume an ac line voltage of 110V (rms) and 60Hz is available. **[5points]**

(c) Suggest two ways to further reduce the ripple. **[3 points]**

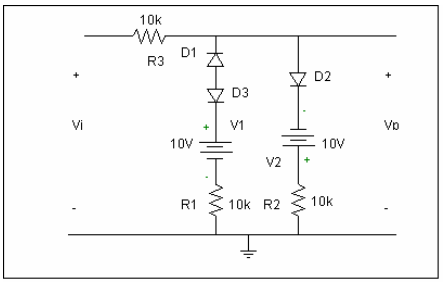


Problem # 2

(a) 5 points

Consider the diode circuit below.

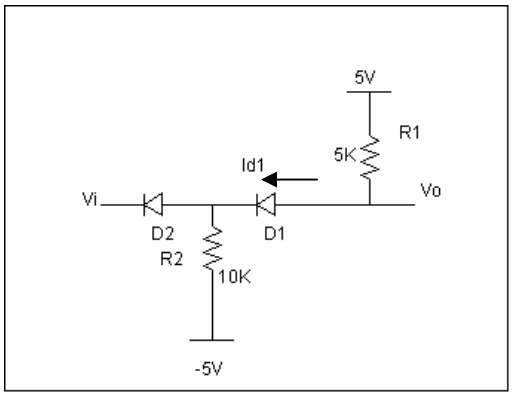
1) State what type application can this circuit be used for (i.e., rectifier, limiter, etc)? **[1 point]**
2) Assume a constant voltage drop model for the diodes (V_D=0.7V). Derive and sketch the transfer characteristic function of the circuit (V_O as a function of V_I). Assume V_I can vary from -20 to 20 Volt. **[4 points]**



Problem # 2

Part b (5 Points)

In the circuit shown, if **Vi = 0**, determine the output voltage V_o and the diode current Id_1. Assume V_{DOn} =0.7v



Problem # 3(10 points)

For the nMOS circuit shown, answer the following questions

If Vs =0

(a) What is the mode of operation of the transistor? Justify your answer **[2point]**

(b) Find the drain current, assume $Kn'\frac{W}{L}=1mA$ and the threshold voltage V_{TH} =1V **[5points]**

(c) Find the gate voltage V_{GS} **[1 point]**

If V_S = 5V

(d) Find the drain current Id and the drain Voltage Vd **[2 points]**