Midterm 1
Principles of Computer Engineering II

NAME:

STUDENT ID:

1. (2 pts) Reverse-breakdown voltage = maximum reverse bias a diode can withstand. T / F
2. (2 pts) Avalanche current is the name given to the current that approaches infinite when a forward biased diode has no current limiting. T / F
3. (2 pts) Silicon diodes are preferred for small signals. T / F
4. (2 pts) A Half-Wave Rectifier uses 2 diodes. T / F
5. (2 pts) The depletion region in a diode decreases when a diode is Forward Biased. T/F
6. (2 pts) The typical V_f of germanium is: _____

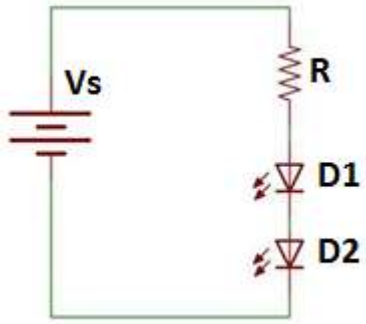
7. (2 pts) if F_{ac} = 2kHz, what is F_{ripple} for a Half-Wave Rectifier _____

8. (2 pts) if F_{ac} = 1kHz, what is F_{ripple} for a Full-Wave Rectifier _____

9. (2 pts) To create a N-Type material, how many valence electrons should the dopant have?

   _____

10. (4pts) In the following circuit, calculate the value of R, given a desired Diode Current of I_{D1} = 8ma, I_{D2} = 8ma. V_s = 22v, V_{fd1} = 1.2v, V_{fd2} = 2.4v

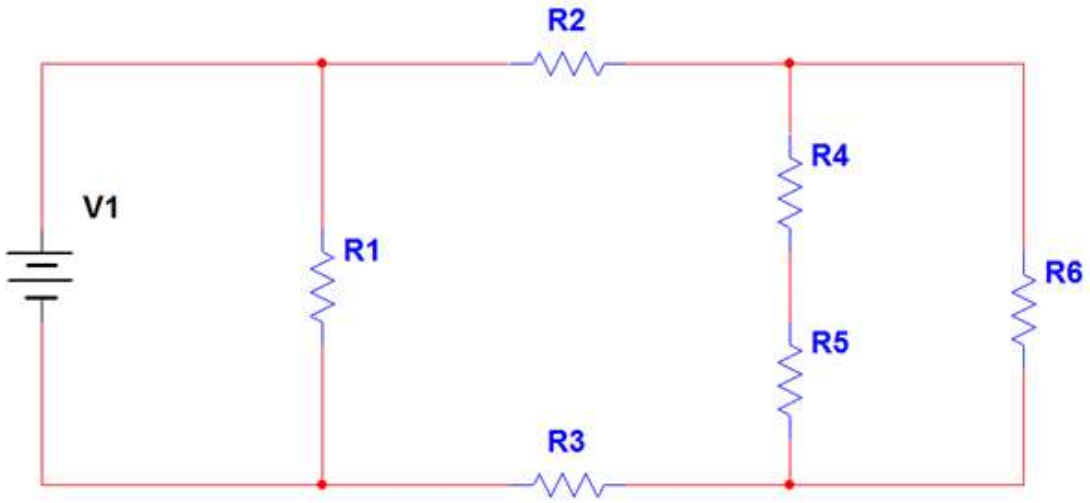


R = _____

Midterm 1
Principles of Computer Engineering II

11. (6 pts) Solve the Following circuit:

V1 = 20v, R1 = 10Ω, R2 = 20Ω, R3 = 10Ω, R4 = 10Ω, R5 = 10Ω and R6 = 20Ω

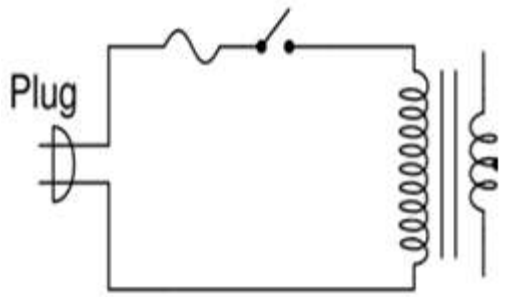


In the circuit above find the current through and the voltage across each resistor.

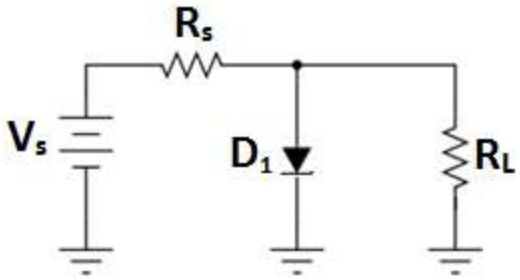
I_{R1}		V_{R1}	
I_{R2}		V_{R2}	
I_{R3}		V_{R3}	
I_{R4}		V_{R4}	
I_{R5}		V_{R5}	
I_{R6}		V_{R6}	

Midterm 1
Principles of Computer Engineering II

12. (8 pts) Complete the schematic below to make a regulated power supply with Vout = 9v and ground clearly labeled. Use a Half-Wave rectifier and a fixed voltage regulator, label any part numbers that you use. Also specify an acceptable transformer ratio assuming a Vin of 100Vpk into the transformer and a max voltage in to the regulator of 30v. Ignore a desired value for Vripple.

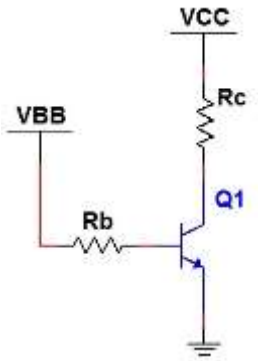


13. (10pts) Fill in the table on the right for the circuit below. Neglect the boxes with X's and the forward voltage V_f of D_1 is 4V



	Rs	R_L	Dz	Vs	
V				20	Volts
I		4m			Amps
R	1k		X	X	Ωs
P				X	Watts

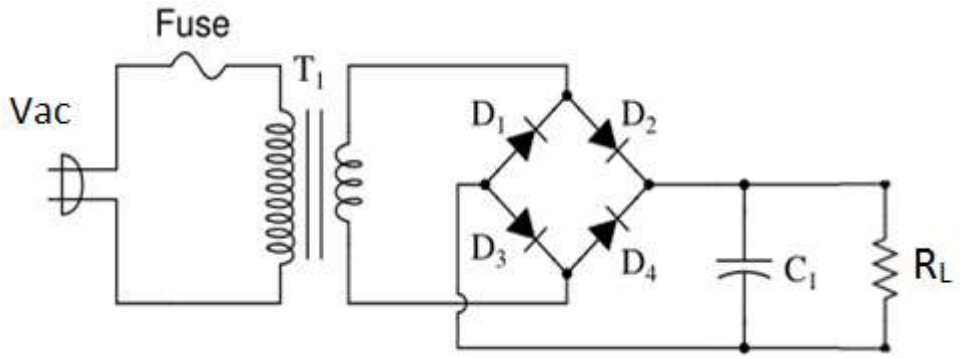
14. (8 pts) Determine the Operating Mode of the following transistor circuit. You will need to find Ic and Vce. β(Beta) of Q1 = 50, VBB = 10v, VCC = 10v, Rb = 100k, Rc = 2k.



Ib = _____ Ic = _____ Vce =_____ Operating Mode = _____

Midterm 1
Principles of Computer Engineering II

15. Answer the following questions for the circuit below.



Vac = 150 V_{RMS} @ 80Hz, T_1 is a 9:1, D1 – D4 are 1N4001 rectifier diodes and R_L = 100Ω

a) (2 pts) Assuming that C_1 is not present. What is V_{pk} across R_L ? _____

b) (2 pts) Calculate the value of C_1 in order to give us a Vripple of 800mv. _____

c) (2 pts) What is the Average DC voltage across R_L given the previously calculated smoothing capacitor?

_____

d) (4 pts) Assuming that in place of R_L we connected an LM317, What is the largest regulated voltage we could generate without dropping out of regulation?

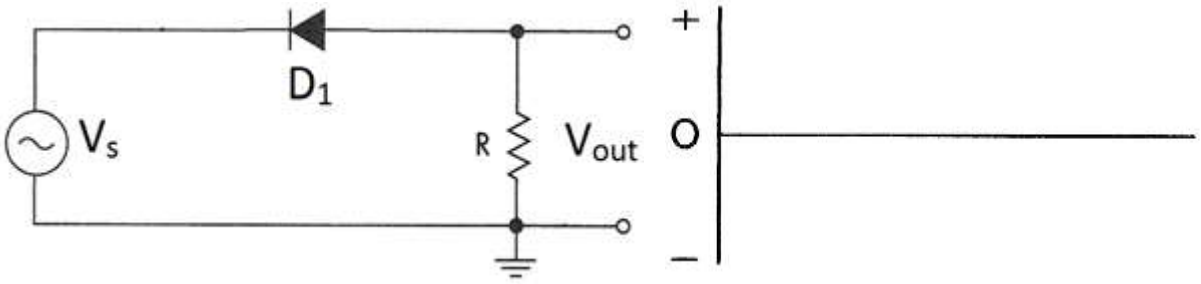
_____

e) (4 pts) Draw the LM317 circuit and calculate the values of R1 and R2 for an 8v regulator.

R1 = _____ R2 = _____

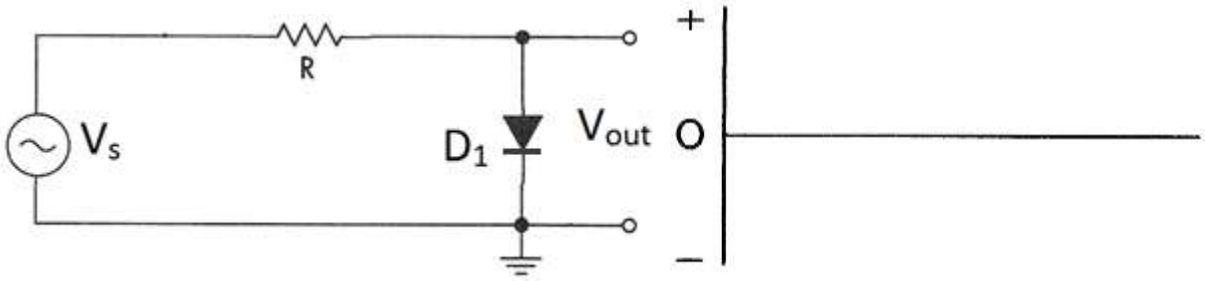
Midterm 1
Principles of Computer Engineering II

16. (5pts) Assume D_1 is a 1n4001 and Vs is $10V_{pk,}$ Draw one cycle of the waveform for Vs and Vout on the graph below.



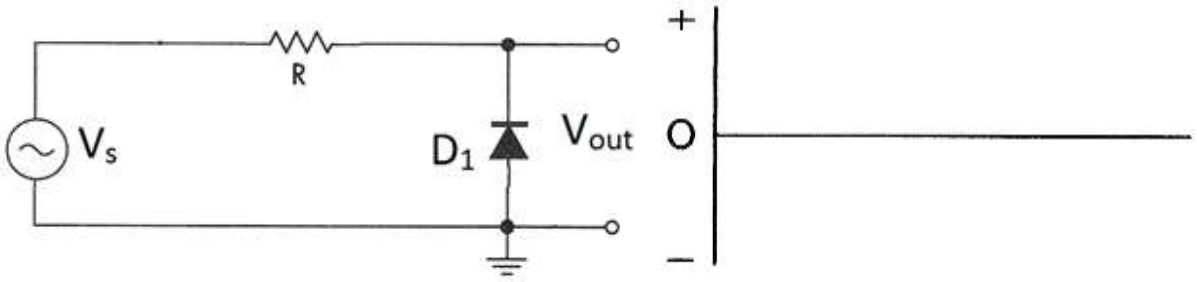
What is Vout in peak-peak voltage? _____

17. (5pts) Assume D_1 is a is a 1n4001 and Vs is $8V_{Pk,}$ Draw one cycle of the waveform for Vs and Vout on the graph below.



What is Vout in peak-peak voltage? _____

18. (5pts) Assume D_1 is a is a 1n4001 and Vs is $8V_{RMS,}$ Draw the waveform of Vs and Vout on the graph below.



What is the peak-peak voltage of Vout? _____