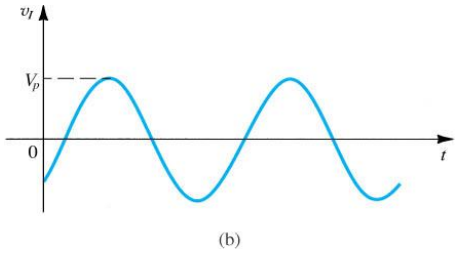
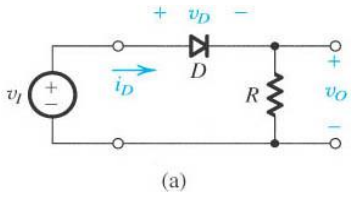
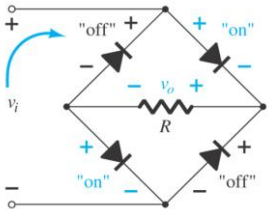
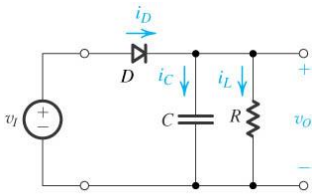
中山大学理工学院 2013 学年 2 学期 期中

12 级微电子 2+2 模拟电子技术 试卷（A）

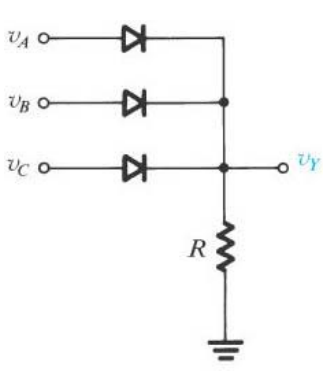
_____年级 _____专业 姓名_____学号_____

老师姓名： 考试成绩 ：

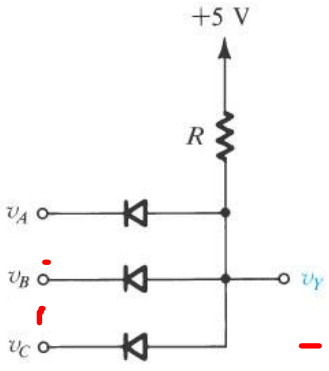
1. Assuming all diodes to be ideal, draw the output waveform for each rectifier circuit. (15%)

Input waveform	Rectifier configurations	**Output Waveforms**
 (b)	 (a)	
		
	 (a)	

2. Assume all diodes to be ideal. Figure out the types of the below logic gates and write the relevant truth tables (10%)



(a)

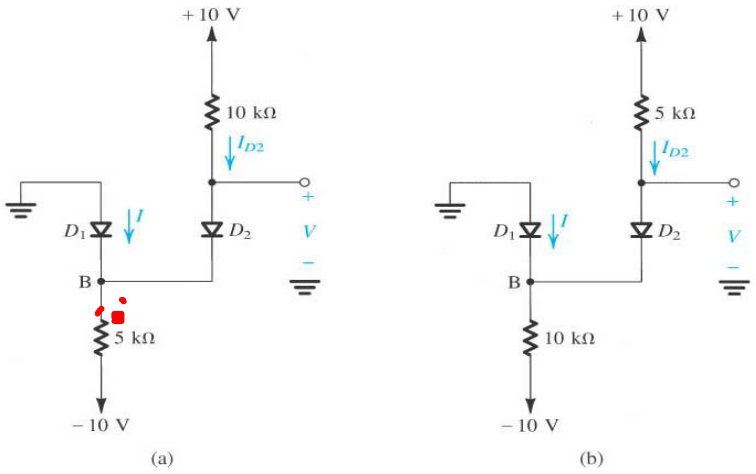


(b)

(a): _____ gate				(b): _____ gate			
v_A	v_B	v_C	v_Y	v_A	v_B	v_C	v_Y
0	0	0		0	0	0	
0	0	1		0	0	1	
0	1	0		0	1	0	
0	1	1		0	1	1	
1	0	0		1	0	0	
1	0	1		1	0	1	
1	1	0		1	1	0	
1	1	1		1	1	1	

Note: logic "1" means high voltage, i.e., around 5V, and logic "0" means low voltage, i.e., around 0V.

3. Assuming the diodes to be ideal, find the values of ***I*** and ***V*** in the following circuits (20%)



4. Fill in the blank areas (30%)

(1) The single-crystal formed by pure semiconductor materials is called _____ semiconductor.

(2) The materials containing impurity atoms are called _____semiconductors, or doped semiconductors.

(3) In *n*-type semiconductors, the impurities are from group ___ elements, e.g. Phosphorus.

(4) In *p*-type semiconductors, the impurities are from group ___ elements, e.g. Boron.

(5) The majority carriers in *n*-type materials are _____.

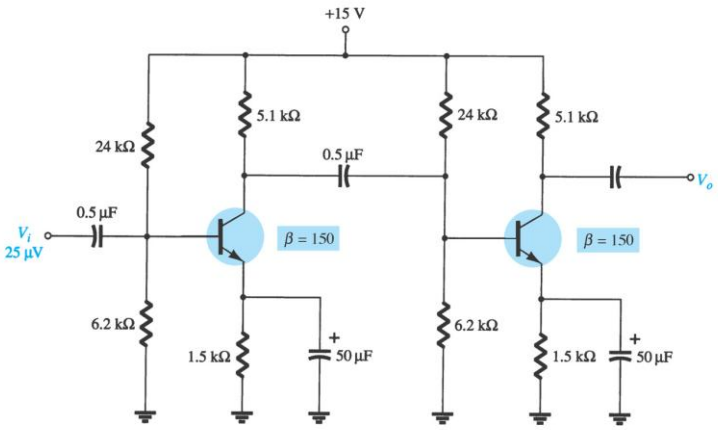
(6) The minority carriers in *n*-type materials are _____.

(7) When doing DC analysis, the capacitor can be treated as _____ circuit and the inductor can be treated as _____ circuit. When doing AC analysis, the independent voltage source can be treated as _____ circuit. (select open or short)

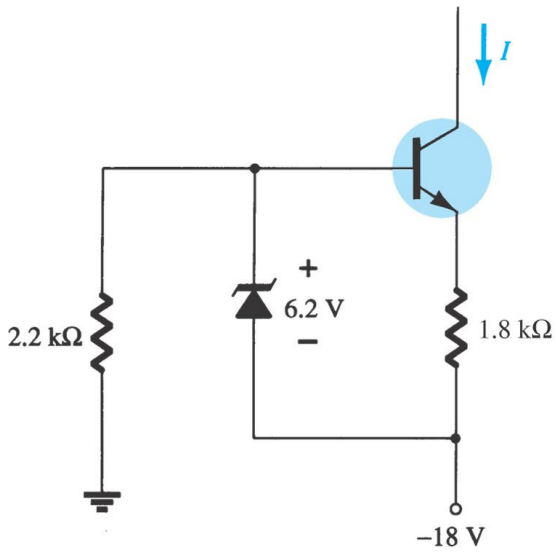
(8) The condition of a BJT working in active regions is that the BE junction is _____ bias and the BC junction is _____ bias. As for BJT working in saturation region, the condition is that the BE junction is _____ bias and the BC junction is _____ bias. (select forward or reverse)

(9) For a BJT amplifier with common-emitter configuration, the input terminal is _____, and the out terminal is _____.

5. (20%) A BJT cascade amplifier is shown below. Assuming $V_{BE(on)}$ is 0.7 V,
   (1) Calculate the dc bias voltages (V_B, V_C and V_E) and collector current (I_C) of each stage;
   (2) Calculate the input impedance, output impedance and the overall ac voltage gain.



6. Assuming $V_{BE(\text{on})}$ is 0.7 V, calculate the constant current I in the following circuit. (5%)



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